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BRITISH MEDICAL JOURNAL

LONDON SATURDAY MAY 31 1941

DA COSTA'S SYNDROME (OR EFFORT SYNDROME)

THE MECHANISM OF THE SOMATIC MANIFESTATIONS *

BY

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Vasomotor Disturbances: 1. Tachycardia

It is this sign above all others which has drawn attention to the heart, yet it is one of the commonest psychosomatic effects, occurring in every one of us under the influence of sufficient emotion. It has been recorded by all observers, and in my own series of 200 cases the pulse rate averaged 82 beats per minute (48 to 136) during casual examination in the day-time, compared with 66 beats per minute (48 to 100) in 50 controls. During sleep, however, it is normal, averaging 60 to 65 in Hume's series (1918). It is customary to speak of the great lability of the pulse, which is said to accelerate unduly with change of posture, with effort, and with adrenaline. The evidence for this, however, is open to criticism.

Statements declaring that there is undue acceleration of the pulse rate on change of posture may be challenged directly, because the published figures do not show it, even those given by authors who make this very statement. Thus in 36 children with "effort syndrome" Bass and Wessler (1913) found the difference between the lying and standing pulse rates to average 7 beats per minute, which was the exact figure obtained by Lincoln (1928) in 320 controls aged between 3 and 13. In adult patients published figures are well within published control figures; they are hardly worth quoting, because little attention has been paid to the behaviour of the pulse on standing up. Douglas and I have found that the initial acceleration lasts for but nine to fifteen seconds in about two-thirds of patients and controls, and is followed by abrupt slowing. It is therefore necessary to count the pulse for the first ten seconds only, after the patient stands up, if the true speed at this time is wanted. In comparing patients with controls we took three readings: (1) during the first ten seconds as described; (2) during the second quarter-minute; (3) at the end of the first minute. The results are recorded in Table IX, and show no essential difference. It is concluded that in the great majority of cases the reaction of the pulse rate to change of posture in children and adults with Da Costa's syndrome is normal; it is suggested that exceptions depend upon interference by an emotional mechanism, for in both patients and controls unusual acceleration with failure to slow down after the initial rise was apt to be accompanied by conspicuous palmar sweating.

TABLE IX.—*Rise of Pulse Rate with Change of Posture*

	No. of Cases	Rise in First 10 Sec.	Rise in Second ¼ Min.	Rise at End First Min.
Da Costa's syndrome	20	21 (6–40)	7.8 (−4 –20)	
	20	24 (8–40)	9 (0 –40)	9 (0–40)
	25			8 (0–28)
Controls	22	24 (6–40)	7.5 (0 –24)	
	40			8 (0–24)

Undue acceleration of the pulse during effort has been assumed by most authors, with the implication that the physiological reaction to effort is abnormal. Few have taken the trouble to test their assertions. Bass and Wessler (1913) found that the pulse rate rose 48 beats per minute after a standard amount of exertion in 36 children with Da Costa's syndrome, compared with 50 beats per minute in controls. Parkinson (1916) compared 20 patients with 20 healthy men, of whom 16 were in the football team, and found that the pulse rate rose 28 and 21 beats per minute respectively after standard effort. Meakins and Gunson (1917) obtained an average rise of 46 beats per minute in 39 patients, compared with one of 34 in 10 controls, after they had climbed 27 steps. Our test consisted in climbing 30 steps, and my results may therefore be compared with those of Meakins and Gunson. If the two are combined it is found that the average rise in 140 patients is 39.8, compared with 40.4 in 25 controls. My controls were ordinary healthy young men, not fully trained soldiers (Table X).

TABLE X

Author	Patients		Controls	
	No. of Cases	Pulse Rise immediately after Effort	No. of Cases	Pulse Rise immediately after Effort
Meakins and Gunson ..	39	46.0	10	34.0
Present series	101	37.4	15	44.6
Total	140	39 8	25	40.4

According to Meakins and Gunson (1917) the pulse rate after effort returns to normal more slowly than in controls, and they showed a close correlation between the deceleration time and the final category of their patients. The effort-tolerance test is based on these findings. The deceleration time is recorded in relation to the final category in 164 of my patients in Table XI. The figures do not support the claims made for this test. It is true that a third of my whole series had a deceleration time longer than two minutes, and this is a higher proportion than is found in controls. But it does not follow that these patients have

* The second of three Goulstonian Lectures to the Royal College of Physicians of London, 1941. The first lecture was published in last week's issue.

TABLE XI

Deceleration Time	No. of Cases	Category Returned (%)		
		A 1 Full Duty	C Light Duty	E Totally Unfit
1 minute	72	33.3	41.6	25.0
2 to 3 minutes	53	28.3	32.0	39.6
Over 3 minutes	39	20.5	46.2	33.3

an abnormal reaction to effort itself, for no attempt has ever been made to control or to assess the degree of emotional reaction in these tests. It may be noted that when Meakins (Meakins and Wilson, 1918) attempted to measure the effect of emotion on the pulse rate he took good care to ensure that the patients were physically at rest. An unexpected pistol-shot or a sudden big flame had no effect on the pulse or respiration rates of 6 controls, but caused a rise in the pulse rate of 3 to 45 beats per minute in all 12 patients, and a rise of respiration rate of 1 to 24 per minute in two-thirds of them. Those with vigorous reactions had poor effort tolerance; those with slight reactions had relatively good effort tolerance. This work helps to show how necessary it is to allow for the effects of emotion in all tests on patients with Da Costa's syndrome. Sir Adolphe Abrahams informs me that effort-tolerance tests were hopelessly unreliable when performed on world-famous athletes during a contest, when the emotional factor was to the fore.

Cotton, Rapport, and Lewis (1917) have shown that if patients and controls are exercised to the breaking-point the final pulse rate is the same—about 155, the normals rising more than the patients. There is no evidence that this tachycardia is harmful, and, as Sir Adolphe Abrahams will testify, there have been a number of men in our unit who performed the heaviest of exercises perfectly and without symptoms, but whose pulse rates were unusually high and remained so for some time afterwards. These men felt and looked fit, and were placed in Category A 1. It must be appreciated that the pulse rate of normal controls during strenuous effort may rise to 190 per minute without causing distress (Gillespie, Gibson, and Murray, 1925). J. E. Lovelock tells me that his may reach 210 beats per minute.

The adrenaline test, introduced by Goetsch (1918) as a test for hyperthyroidism, consists in injecting 0.5 mg. of adrenaline subcutaneously and observing its effect on the pulse rate and blood pressure. It is positive if either rises 10 or more points. As a test for hyperthyroidism it was soon abandoned, because it was found to be positive in many other conditions, including "effort syndrome" (Peabody *et al.*, 1918, 1921; Kessel and Hyman, 1923). The implication that patients with Da Costa's syndrome are hypersensitive to sympathetic stimulation is not justified, for hypersensitivity to adrenaline can only be tested by intravenous administration, its effect when given subcutaneously or intramuscularly being influenced by its rate of absorption and by its rate of destruction in the tissues. Positive reactions in thyrotoxicosis may well be due to rapid absorption, for the increased blood flow in this condition is well known. A similar explanation may hold true for some cases of Da Costa's syndrome. Fraser and Wilson (1918) and Hume (1918) tested the effect of 0.1 mg. of adrenaline by intravenous injection. Their combined results show a rise of pulse rate of 28 in 22 cases of Da Costa's syndrome and of 28 in 9 controls. It is concluded that these patients are not hypersensitive to adrenaline as judged by the pulse rate. I believe this to be of fundamental importance, for it shows that the heart does not over-react to normal sympathetic stimulation—that it is not, in fact, irritable.

A possible cause of tachycardia is diminished vagal tone. This was investigated by Cotton, Rapport, and Lewis (1917). After the intravenous injection of 1 to 1.5 mg. (0.002 grain per stone of body weight) of atropine, the pulse rate rose 26 beats a minute in 7 patients and in 6 controls. Acceleration of the pulse rate on effort was increased by 29 beats a minute after atropine in both groups. They concluded that vagal tone was normal, for its release had the same quantitative effect in patients and controls. Their work was confirmed by Friedlander and Freyhof (1918), who used 2 mg. of atropine and found a rise of pulse rate of 30 beats a minute in 10 patients and of 28 in 10 controls. Sturgis, Wearn, and Tompkins (1919) obtained a rise of 30.4 beats a minute in 21 patients, against 21.8 in 10 controls, using 1.2 mg. of atropine subcutaneously. The degree of acceleration in their patients equalled that obtained in the other series quoted when the intravenous route was employed, and I therefore suggest that absorption may have been quicker in the "effort syndrome" cases.

2. Blood Pressure

At rest the blood pressure is normal (Cohn, 1919; Craig and White, 1934). During the first examination of the patient, when he is nervous, it is often elevated, averaging 145/85 in my series. That these high initial pressures do not imply incipient hypertension is proved by the follow-up study of Grant (1925) and by the cold pressor test of Hines (1940). Using the technique described by him, I found that 10% of 25 unselected cases gave a positive reaction, compared with 15% of controls (Hines); the average rise of blood pressure in the remaining 90% was 8/8.5, compared with 12.4/10.1 in Hines's controls. The lack of emotional response to this test was quite striking, and may be explained by its painless nature and by its complete dissociation from the constellation of ideas which commonly provoke an emotional reaction in these patients.

In normal subjects, during any kind of physical effort, the blood pressure rises slowly the first five or ten minutes, and then gradually falls away towards the resting level whether there is fatigue or not (Gillespie, Gibson, and Murray, 1925); immediately after effort there is an abrupt drop, followed quickly by a secondary rise which reaches a maximum in 10 to 90 seconds and then falls towards normal (Barringer, 1916, 1917): the greater the effort the higher the rise afterwards, and the more delayed its summit (Cotton, Rapport, and Lewis, 1917). Patients with "effort syndrome" are said to behave like normal subjects after greater effort (Cotton, Rapport, and Lewis, 1917; Mabon, 1919).

The effect of adrenaline depends upon the way it is given: if injected intravenously patients and controls react alike, the blood pressure rising 27 mm. Hg in 22 patients and 31 mm. Hg in 9 controls, combining the results of Fraser and Wilson (1918) and Hume (1918); if it is given intramuscularly or subcutaneously patients react more than the controls, as they do with reference to the pulse rate.

3. Dermatographism

Although it is often stated that dermatographism is common in "effort syndrome," there is no evidence to that effect. Cotton, Slade, and Lewis (1917) investigated the local vascular response to stroking the skin between the shoulder-blades with a blunt instrument in a group of 84 patients who happened to have "effort syndrome"; but they did not maintain that the reactions obtained were in any way abnormal, and they chose these cases only because there were no others. The simple red line occurred in 35 (with or without white borders), the flare or spread in 49; visible urticaria appeared in a quarter of them, and a fully developed wheal in 5%. Addis and Kerr (1919) found a well-defined red reaction in 36% of 413 recruits, 9% of

whom had "effort syndrome," but they did not state whether it was commoner in those with "effort syndrome" than in those without. The intensity and type of reaction depend upon the pressure exerted as well as upon the patient.

I stroked the skin between the shoulder-blades of 25 patients and 50 controls, using moderate pressure with a blunt-ended glass rod. The red reaction was obtained in all the patients: it was faint in 5, associated with a flare in 4, and with wheal formation in 1. The controls responded similarly, all but 3 showing a red reaction—6 with flares and 4 with wheals. I conclude that the capillary and arteriolar response to stroking the skin between the shoulder-blades in patients with Da Costa's syndrome is normal. It is mentioned because it is an example of a normal peripheral vascular reaction to a stimulus divorced from emotion.

4. Cold Blue Extremities

Cold blue hands occurred in 44.5% of my series. Despite the conclusion of Grace Briscoe (1918) and the remarks of Best and Taylor (1939), there can be little doubt that they are due to vascular spasm, being relieved by sympathectomy (White, 1935) and by heat (personal observations with skin-temperature thermometer). They are not constant, being often absent first thing in the morning, and being exaggerated by emotion (Mittelmann and Wolff, 1939), by hyperventilation (Abramson and Ferris, 1940), and by cold.

5. Dizziness

This may occur spontaneously during or after effort, with sudden change of posture, or at any odd moment. It may be reproduced by asking the patient to stoop and then suddenly stand erect, by compression of the common carotid artery below the sinus, or by hyperventilation. As these three measures reduce the cerebral blood flow (Norcross, 1938), it is reasonable to suppose that spontaneous dizziness may be so caused. Any stimulus causing momentary fall of blood pressure or hyperventilation may be to blame; emotion is such a stimulus.

6. Syncope

Syncope unassociated with organic disease is of two types: that due to critical reduction of cerebral blood flow, as may follow a profound fall of blood pressure—the vasomotor type; and that in which no reduction can be demonstrated—the cerebral type (Lennox, Gibbs, and Gibbs, 1935). Syncope due to hypersensitivity of the carotid sinus (Weiss, etc., 1933, 1936; Ferris, etc., 1935, 1937) is usually vasomotor, but may be cerebral (Lennox, Gibbs, and Gibbs, 1935; Smith and Moersch, 1935; Robinson, 1939). Syncope following hyperventilation may be due to critical reduction of cerebral blood flow resulting from vasoconstriction (Forbes, Wolff, and Cobb, 1929; Norcross, 1938), or it may be of the cerebral type (cf. its effect on patients with petit mal and epilepsy).

In Da Costa's syndrome syncope is usually vasomotor (Cotton and Lewis, 1918; Brooks, 1924). Marked slowing of the pulse may or may not occur, and is unimportant. Adrenaline, not atropine, is curative. I have found no instance of hypersensitive carotid sinus among my patients; on the contrary, the reflex seemed to be depressed. There was no reaction in 65%; slowing was slight in 30%, moderate in 5%, and considerable in none. Spillane (1940) found no abnormal response in 90%. Douglas and I reproduced syncope in one patient by forced breathing. The pulse rate was 124 and the blood pressure 165/100 during the period of unconsciousness, so we concluded that syncope was due to cerebral vasoconstriction or that it was cerebral in type. As this patient showed hyperventilation on emotion on numerous occasions, we believe this to have been the mechanism of his frequent syncopal attacks.

Whatever the physiological mechanism of syncope, it usually represents an emotional reaction.

7. Headache

I investigated 21 cases of significant headache. They fell into two groups—throbbing and vague. There were 8 with throbbing headaches, the throb coinciding with the pulse rate. These were usually temporo-frontal, and could be initiated or aggravated by effort or by trinitrin. Undue pulsation of the cervical arteries was recorded in 3; the systolic blood pressure was between 150 and 190 in half of them; compression of the common carotid artery relieved all of them, usually only on the ipsilateral side; compression of both temporal arteries helped in 2 out of 3 in which it was tried; bilateral jugular compression relieved 6, but had no effect on the other 2. Change of posture had a variable result—3 being aggravated, 3 being relieved, and 2 remaining unchanged. This type resembles the histamine headache (Pickering and Hess, 1933) and the headaches of fever (Sutherland and Wolff, 1938), alcohol (Thomas, 1937), and other cerebral vasodilators. The essential mechanism depends upon increased pulsation of the intracranial vessels (Pickering and Hess, 1933; Pickering, 1939; Clark, Hough, and Wolff, 1936). Relief is obtained by any measure which lowers the amplitude of excursion of the offending arteries.

In the other 13 cases the headaches were vague, and obeyed no rules. Their nature remains obscure, but they are not unlike the other vague aches and pains to which these subjects are notoriously prone.

Sweating

Very little detailed attention has been paid to sweating in Da Costa's syndrome. Cotton, Slade, and Lewis (1917) compared the reactions of 8 patients and 6 controls to pilocarpine nitrate. When 1/5 grain was administered subcutaneously the response was the same in both groups. With 1/10 grain the patients reacted a little more than the controls, but the difference was not enough to be significant.

Of the utmost importance is the distribution of the sweating, for in most cases it is confined to the palms of the hands, the soles of the feet, and the axillae. The studies of Kuno (1934), List and Peet (1938a, 1938b), and others have demonstrated that this form of sweating requires an emotional stimulus. As pointed out by Darwin (1872), it is all the more remarkable because the hands are cold; but this seems strange only to those who associate sweating with heat. Thermal sweating and that induced by the cholinergic drugs have an entirely different distribution. In the main, sweating provoked by effort is thermal, but an emotional response may occur at the onset or in anticipation of effort.

Not only does the distribution of sweating in Da Costa's syndrome necessitate an emotional stimulus, but this stimulus is witnessed again and again. Typical situations include waiting for the doctor, inspection by an officer, waking from a nightmare, an anxiety attack, a fainting attack, standing behind a fluoroscopic screen, etc. Undue sweating in hot weather is rare and the effect of effort variable.

I was not surprised, therefore, to find no hypersensitivity to the cholinergic drugs. Fifteen patients and 5 controls were given 6 mg. of acetyl-beta-methylcholine (mecholyl) subcutaneously, the sweat reaction being observed with the aid of an iodine and castor-oil paint on which was dusted powdered starch (Minor, quoted by List and Peet, 1938a). An arterial tourniquet was placed round one arm so that an emotional sweat reaction in the palm could be detected. The degree of sweating was assessed by giving marks of 1, 2, 3, 4, and 5 for fine stippling, coarse stippling, semi-coalescence, coalescence, and trickling, respectively, and

subtracting the figure before the injection of mecholyl from that achieved after it. Five sites were selected for observation—the brow, chest, axilla, free palm, and obstructed palm. The average results are recorded in Table XII.

TABLE XII.—*Sweat Response to Acetyl-beta-methylcholine*

Cases	Brow	Chest	Axilla	Free Palm	Obstructed Palm
15 patients	1.6	1.2	0.8	0.3	0.06
5 controls	3.2	1.8	1.8	0.6	0.40

Further controls were not considered necessary because even if the next 5 did not sweat at all the reaction in the patients would still be less than in the controls. The findings are all the more impressive because the patients chosen were those with conspicuous sweating. Five other patients and 3 controls were tested with carbo-amino-acetylcholine (doryl), with similar results. It is concluded that patients with Da Costa's syndrome are not hypersensitive to cholinergic drugs.

I have checked the fact that palmar sweating is due to central stimulation by placing an arterial tourniquet round one arm and noting that sweating continues to the same degree in the obstructed palm as in the free.

Fatigue

This aspect of Da Costa's syndrome has not yet been properly investigated. Providing there is an adequate supply of fuel, oxygen, and water, and proper means of disposal of carbon dioxide and heat, the normal dog is virtually tireless (Dill, Edwards, and Talbott, 1932). The fasting blood sugar, the blood sugar at the end of effort sufficient to induce fatigue, and glucose-tolerance curves are normal in Da Costa's syndrome (McCullagh, 1934; and personal observations); there is no evidence of oxygen want, as discussed under "Breathlessness," or of dehydration; heat and carbon dioxide appear to be eliminated satisfactorily. Obvious causes of fatigue do not apply, and case histories suggest an entirely different mechanism. One patient described how he felt when a bomb dropped near him in France: he was panic-stricken, and the onset of gross fatigue was immediate and abrupt, so that he could not withdraw the bolt of his rifle, and could only crawl along with the greatest difficulty. Only a nervous mechanism could have acted so quickly.

The relation of the autonomic nervous system to skeletal muscle action is interesting. Sympathetic stimulation increases the power of voluntary muscle and reduces fatigue independent of its parallel action in mobilizing sugar (Kuntz and Kerper, 1924; Gruber, 1924); ephedrine reduces fatigue in myasthenia gravis. Injected cholinergic drugs produce a sensation of fatigue and weakness similar to that experienced by the patients; prostigmin, which inactivates cholinesterase, thereby preventing destruction of acetylcholine, is the best remedy for the fatigue of myasthenia gravis. The full significance of such facts has yet to be learned, as has the mechanism of paralysis by fright.

Suprarenal cortical extract should prove a useful ally of psychotherapy in treating fatigue. It practically doubles the effort capacity of treadmill-running normal dogs (Eagle, Britton, and Kline, 1932), increases the effort capacity of normal human beings by 50 to 500% as measured on the ergometer (Hartman, Greene, Bowen, and Thorn, 1932), quiets and improves experimental neurosis in sheep (Liddell, Anderson, Kotyuka, and Hartman, 1935), and relieves depression and reduces fatigue in psychoneurotics, including patients with "effort syndrome" (Hartman, Beck, and Thorn, 1933; Huddleson and McFarland, 1939; Schaefer and Strickroot, 1936).

Respiratory Manifestations

There can be no doubt that these patients experience a true sensation of breathlessness in circumstances which would not affect a normal person. Hurried, irregular, and shallow breathing is common in the more nervous patients, apart from effort; frequent deep sighs occur in many; in a few there is true hyperventilation, usually the result of emotion.

Breathlessness is not due to diminished vital capacity (Levine and Wilson, 1919; Adam and Sturgis, 1919) or to slowing of the circulation time (Spillane, 1940); it is not associated with excess of carbon dioxide in the alveolar air (Drury, 1920) or with excess of carbon dioxide in the blood as judged by the carbon-dioxide-combining power of the plasma, which is normal (Adams and Sturgis, 1919; Wilson, Levine, and Edgar, 1919; van Slyke, 1921), or with excess of other acid metabolites on the same grounds. On the contrary, the alveolar carbon dioxide tension is reduced; there is intolerance to carbon dioxide in the inspired air, and intolerance to accumulation of carbon dioxide when the breath is held (Drury, 1920). In my series of 200 cases the average breath-holding time was 21 seconds: it was over 30 seconds in 24%; 11 to 30 seconds in 46.6%; and 2 to 10 seconds in 29.3%. Normal subjects have no difficulty in holding their breath for at least 30 seconds (Drury, 1920; White, 1920; and 50 controls of my own). Further, after forced breathing for 45 seconds the breath-holding time remained about the same in those with low figures; indeed, many of these patients hyperventilated after forced breathing. In normal subjects rapid deep breathing for two minutes is followed by apnoea for periods up to two minutes (Haldane and Poulton, 1908); maximum hyperventilation for 45 seconds is followed by apnoea for 15 to 35 seconds (average 24 seconds) in 90 to 95% (Henderson, 1908). With the help of Drs. Douglas and Daniell, I have observed the effect of forced breathing on 100 patients with Da Costa's syndrome. Hyperventilation was carried out for 2 to 10 minutes in the first group of 50 and for 45 seconds in the second group of 50, but as the results were similar they have been combined. Apnoea lasting 5 to 60 seconds (average 24 seconds) occurred in 65, there was quiet breathing in 5, and hyperventilation continued for one to three minutes in 30. Dividing the cases into those with considerable breathlessness and those without, it was found that 25 out of 37 breathless patients hyperventilated after forced breathing, compared with 5 out of 63 in whom breathlessness was unimportant. Although minute-volumes were not measured, other classical symptoms of hyperventilation (dizziness, paraesthesia, shakiness, etc.) were nearly always produced, showing that enough carbon dioxide was washed out to induce tissue alkalosis. All those who hyperventilated after forced breathing said that they felt breathless, the sensation being indistinguishable from their spontaneous breathlessness. The evidence indicates that these patients may feel breathless when the carbon dioxide content of the arterial blood is lowered to a degree which causes apnoea for 20 to 30 seconds in normal persons.

It follows that if the stimulation to the respiratory centre is chemical the changes must be local. For example, local vasoconstriction, which would be increased by forced breathing, might lead to local oxygen want and to accumulation of lactic acid, so that the respiratory centre would respond to an abnormally low concentration of carbon dioxide. Such a mechanism would resemble that of the dyspnoeic phase of Cheyne-Stokes breathing. In the latter, however, hyperventilation causes apnoea by burning the lactic acid and reducing the carbon dioxide tension, whereas in the cases under consideration the hypothesis is that hyperventilation, by causing undue cerebral vaso-

constriction, increases local oxygen want, encourages further accumulation of lactic acid, and induces the respiratory centre to respond to even lower concentrations of carbon dioxide. I have tested the theory in two ways. (1) Since theophylline-ethylenediamine (aminophylline, euphylline, cardophylline, etc.) abolishes Cheyne-Stokes breathing, it should have some effect on such a mechanism as that described. If its action is to stimulate the respiratory centre directly, then the breath-holding time should be diminished and post-hyperventilation dyspnoea increased; if its action is by way of cerebral vasodilatation so that lactic acid is burned by increased oxygen supply to the respiratory centre, then the breath-holding time should be increased and post-hyperventilation dyspnoea abolished or diminished. Accordingly, I gave 0.24 gramme of this substance intravenously to 5 patients immediately before repeating their respiratory tests, but it influenced neither the breath-holding time nor, so far as could be judged clinically, post-hyperventilation dyspnoea. (2) If cerebral vasoconstriction has anything to do with the breathlessness, the latter should be influenced by cerebral vasodilators; but 10 mg. of acetyl-beta-methylcholine injected subcutaneously into five patients neither improved the breath-holding time nor reduced post-hyperventilation dyspnoea. These findings therefore do not support the hypothesis.

A much more probable explanation is that the stimulus is emotional. The effect of fear on respiration has been described by Darwin (1872), Henderson (1908), Cannon (1929), Finesinger (1939), and many others. Spirometric tracings from patients with Da Costa's syndrome often show irregularity of rate, depth, and level (Christie, 1935) similar to tracings obtained from cases of anxiety neurosis and other psychoneuroses (Nielsen and Roth, 1929; Christie, 1935). That inability to hold the breath may be hysterical or due to lack of determination is suggested by the observation that very few of these patients have dyspnoea or show any kind of distress when they reach the breaking-point—in contrast to controls. Post-hyperventilation dyspnoea may also be hysterical, for Fraser and Sargant (1938) found that hyperventilation tends to induce a hypnotic state, especially in suggestible individuals; and my colleague Dr. Gillespie successfully treated two trial cases of this sort by means of hypnotic suggestion. After treatment post-hyperventilation dyspnoea no longer occurred, and breathlessness on effort was much diminished.

Whatever the true explanation, the fact that hyperventilation makes many of these patients breathless is important, because it means that whenever breathlessness is induced another mechanism is ready to increase and prolong it. The whole subject is being investigated more thoroughly by my colleague Dr. Maxwell Jones.

The Hyperventilation Theory

Collip and Backus (1920) first suggested that certain symptoms provoked by effort (e.g., cramp in runners and swimmers) might be due to ventilation in excess of that required. Spontaneous hyperventilation tetany following effort was described in five cases by Goldman (1922) and in one case by Lawrence and McCance (1930), and was mentioned by Barnes and Greaves (1936); but it was Soley and Shock (1938) who first claimed that hyperventilation was responsible for the symptoms of "effort syndrome." They described a typical case, complicated by spontaneous attacks of hyperventilation. They reproduced the symptoms in this case and in six others by forced breathing. Biochemical studies revealed a rise in the *p*H of the blood, a fall of the plasma carbon dioxide, and a corresponding fall of the plasma bicarbonate. Their theory is unjustified on their evidence, for the same symptoms and the same biochemical findings may be induced by forced breathing in controls, and they made no attempt to correlate these phenomena with effort. This is essential, of course, but especially so because forced breathing before effort increases the capacity for effort in controls (Douglas and Haldane, 1909a, 1909b).

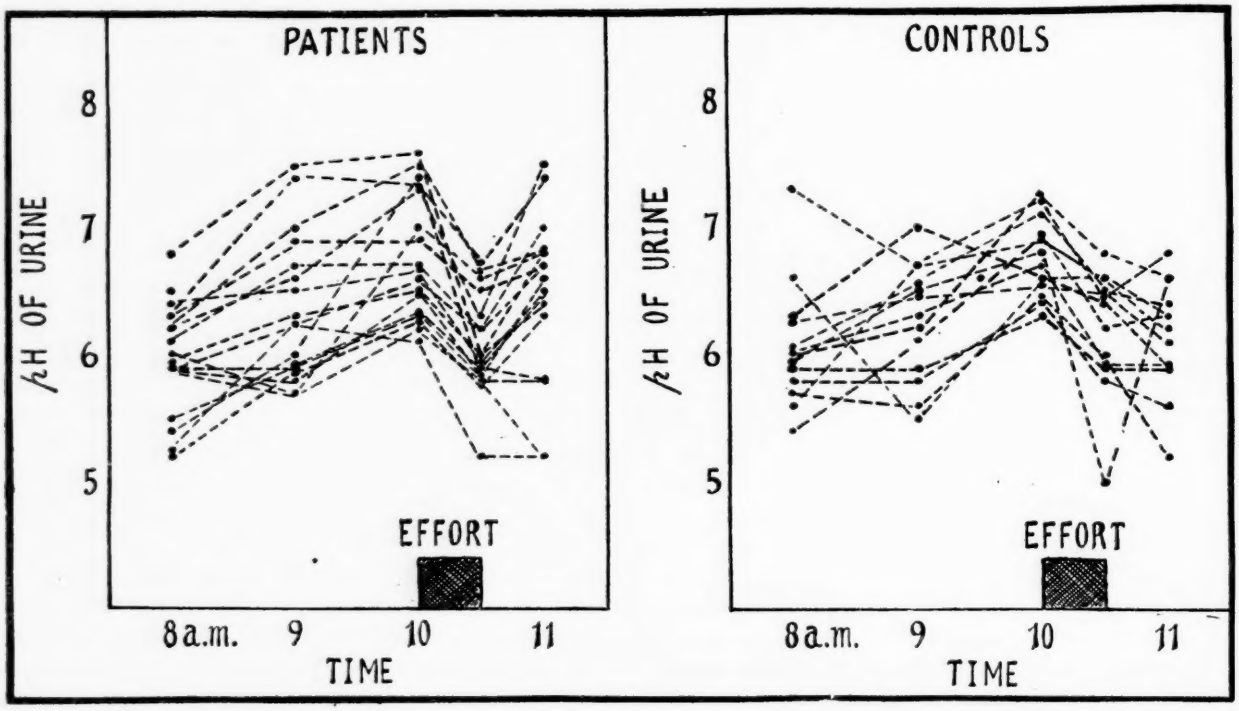
The chief symptoms of hyperventilation are dizziness, paraesthesia, shakiness, a dazed mental state, and "tonic paralysis" (Henderson, 1908). The tonic paralysis was not recognized as tetany until 1920 (Collip and Backus, 1920; Grant and Goldman, 1920). They are closely correlated with tissue alkalosis, carbon dioxide wash-out resulting in an immediate fall of plasma bicarbonate so that the correct *p*H level of the blood is maintained. As the amount of alkali excreted in the urine is not sufficient to account for the fall in plasma bicarbonate, it is thought that alkali passes out of the blood into the tissues. Spontaneous attacks are cured by tetany, which neutralizes tissue alkalosis by acid products of metabolism (Barnes and Greaves, 1936; Fraser and Sargant, 1938).

Certain observations may support the theory of Soley and Shock. Spontaneous hyperventilation tetany occurs typically in psychoneurotic subjects (Goldman, 1922; Fraser and Sargant, 1938; Fowweather, Davidson, and Ellis, 1940); it is usually initiated by emotion (Henderson, 1908), palpitations (Maytum, 1933), pain (Rosett, 1924), anxiety or sinking feelings (Fraser and Sargant, 1938), and may be aggravated by heat (Landis *et al.*, 1926); it may be associated with cardiovascular neurosis (Kerr, Dalton, and Gliebe, 1937; Maytum and Willius, 1934) or with acute infections of the upper respiratory tract (Goldman, 1922). Many of the symptoms of Da Costa's syndrome are reproduced by hyperventilation, and although Guttmann and Jones (1940) object that palpitations and pain are very rarely reproduced, I do not entirely agree; for Douglas and I induced pain in 15 out of 38 patients in whom it occurred, and palpitations initiated spontaneous hyperventilation in all cases seen by Maytum (1933) at the Mayo Clinic, and so occupy a peculiar relation to it; further, when breathlessness is the chief symptom, forced breathing induces a sensation of breathlessness in the majority, and hyperventilation replaces apnoea at the end of the experiment. Many of the signs of Da Costa's syndrome are also produced by hyperventilation: tachycardia (Henderson, 1908; Henderson *et al.*, 1918; Hill and Flack, 1910); fall of blood pressure (Dale and Evans, 1922; Vincent and Thompson, 1928; McDowall, 1930); flushing or pallor (Collip and Backus, 1920); tremor (Henderson, 1908); increased muscle tone (Henderson, 1908); increased tendon jerks (Rosett, 1924); profuse sweating in a few (Collip and Backus, 1920); mild leucocytosis (Collip and Backus, 1920); and increased susceptibility to pain, tenderness, and tickling (Rosett, 1924). The objection that the fast breathing of patients with Da Costa's syndrome (average 27 per minute, compared with 16 per minute in controls: Drury, 1920) is too shallow to cause hyperventilation is not valid, for with rapid shallow breathing the minute-volume may vary between 3 and 24.6 litres (Mudd, 1925), and tetany may occur (Barker and Sprunt, 1922; Harrop and Loeb, 1923).

Against all this evidence, which is merely suggestive, are the facts that tissue alkalosis predisposes to greater effort (Douglas and Haldane, 1909a, 1909b), that ventilation in excess of the body's needs has not been demonstrated during effort, that the plasma bicarbonate is not reduced (Adams and Sturgis, 1919; Wilson, Levine, and Edgar, 1919), and that the urine is nearly always acid.

If there was excess ventilation during effort, sufficient to cause symptoms from tissue alkalosis, the plasma CO_2, and consequently the plasma bicarbonate, would be lowered, and this would be reflected in the urine by a rise in the urinary *p*H, which is one of the most constant

and conspicuous changes in all patients and controls during hyperventilation. Accordingly, I tested the effect of effort on the *p*H of the urine in 17 patients and 13 controls; the graphs shown in the accompanying figure demonstrate normal development of an acid urine during effort, but they do show a tendency to hyperventilation after effort. Dr. Archer has kindly confirmed these results for me by measuring total urinary acidity and urinary ammonia: both rose during effort. It follows that symptoms during effort cannot be due to tissue alkalosis. Symptoms after effort may or may not be due to hyperventilation.



Graphs showing normal development of acid urine during effort, and a tendency to hyperventilation after effort.

According to Hill and Flack (1910) hyperventilation may cause distress by interfering with the circulation. They suggested that very deep inspirations might cause cardiac tamponade by pulling the pericardium taut. The result of this would be elevation of the venous pressure, diminished circulation through the lungs, relative anoxaemia, and carbon dioxide retention. The theory was based on their observation that normal subjects could hold their breaths for six minutes after breathing oxygen moderately deeply, but only for a minute or two after extreme hyperventilation. Henderson, Prince, and Haggard (1918) believed that this interference with the circulation might explain the absence of apnoea after hyperventilation in 5 to 10% of controls. That this mechanism does not operate in the post-hyperventilation dyspnoea seen in the breathless type of Da Costa's syndrome is easily proved. I made direct and continuous measurements of the venous pressure during and after hyperventilation in 5 such cases, but no obstruction to the cardiac inflow could be detected. Further, tachycardia is not a special feature of those with pronounced respiratory symptoms, but rather are there two types of case—those with "respiratory neurosis" and relatively normal cardiovascular behaviour, and those with "cardiovascular neurosis" and a relatively normal respiratory mechanism: the former complain chiefly of breathlessness, the latter of palpitations. The majority are, of course, mixed to a greater or less degree.

The total evidence indicates that hyperventilation cannot be held responsible for the symptoms and signs of Da Costa's syndrome, neither by causing tissue alkalosis nor by interfering with the circulation; but it does occur in some, and when present must aggravate certain of the symptoms. In any case, spontaneous hyperventilation is not a diagnosis, but, apart from rare organic causes, merely one mechanism by which psychosomatic manifestations are produced. It is commonest in the hysteric.

Hyperadrenalism

In a series of articles Crile (1931, 1932, 1934a, 1934b) claims that "neurocirculatory asthenia" results from hyperadrenalism, a condition parallel to hyperthyroidism. He thinks that cerebral association mechanisms are overactive, so that weak stimuli, which would not affect a normal individual, are sufficient to produce an emotional response in these persons. On each occasion the adrenal-sympathetic system is stimulated, the symptoms of effort syndrome being produced. These symptoms become associated with the stimuli in the cortex of the brain, activate the thalamus as conditioned stimuli, and so complete the vicious circle. He says that sensations from viscera usually cause the feeling which is termed "nervousness," and that the anticipation of feeling these disagreeable sensations is the common cause of the anxiety neurosis which may be present. In order to break the vicious circle Crile has evolved the operation of suprarenal denervation. He claims by this means to have cured 61% and improved 33% of 114 cases of "neurocirculatory asthenia." One of his cases has been reported separately (Anderson, 1936).

I selected a patient for suprarenal denervation—a man who had been discharged from the Army and who had returned at my request as a civilian. He was 24 years old, and gave the following history:

His parents were strong and healthy, and appeared to be normal enough when I interviewed them. Four years previously he had been brought to the edge of a nervous breakdown by repeated painful manipulation of his hands following injury to the tendons. He recovered, however, and did good work as a wood machinist until October, 1939, when documents showed that he lost his job through trade stagnation and reduction of staff. He volunteered for service in October, and in January, 1940, fell ill with influenza, after which he complained of fatigue, tremor, dizziness, breathlessness, palpitations, flushes, headaches, occasional loss of consciousness, sighing respiration, cramps, sweats, and left breast

pain. We were unable to find any cause for his condition, and he seemed very anxious to get well. Although he had been told by several doctors that his heart was diseased, he accepted our reassurance and explanation to the contrary. Examination revealed no organic disease, but there were tremor, profuse sweating of the palms and axillae, overaction of the heart, tachycardia, objective breathlessness, obvious nervousness, and shakiness. The blood pressure was 165/100 to 210/115; the pulse rate 68 to 152. While in hospital he was observed to have spontaneous attacks in which all his symptoms and signs were exaggerated.

Suprarenal denervation was kindly performed by Mr. Boyd, to his technical satisfaction, in August, 1940. The patient made an uninterrupted recovery, and during his stay in hospital appeared much improved; during air raids he showed no alarm, and said he was anxious to enter the Air Force and train as an air gunner. It was not thought advisable to make repeated examinations at that time, but he was asked to return to the hospital, and was seen by me in January, 1941.

He said he was much better, was tired of being a civilian, and wanted to know if he could now join the Air Force. A few questions revealed that he had done no work, and that on the only occasion when he had attempted it he "came over queer," just like he used to, and had to sit down. He expressed considerable anxiety about lower abdominal pain and scar tenderness. He wore a home-knitted woollen garment to protect his flanks from the cold.

Despite his protestations to the contrary, he looked as nervous and shaky as before. Tremor, sweating, overaction of the heart, and tachycardia were unchanged; the pulse rate was 100, the blood pressure 175/105. The only alteration was the change in his focus of attention: whereas he used to be concerned about his heart and lungs, he was now worried about his lower abdomen.

The lack of any sign of objective improvement in this case is not encouraging.

While the experiments of Cannon (1928) make it highly probable that the adrenal glands play their part in the mechanism of psychosomatic phenomena, there is no evidence that they hold a more important position.

(Lecture III will appear next week with a complete list of references.)

RAPID IDENTIFICATION OF CL. WELCHII BY THE NAGLER REACTION

BY

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The usual criterion for the rapid identification of *Clostridium welchii*, apart from its morphology and colony form, is the production of a stormy clot in litmus milk. However, this reaction may be falsely negative, for some strains of *Cl. welchii* are non-clotters, and with others the test fails because the inocula employed are too small. For example, in a test of 58 strains the seeding of a whole colony was insufficient to establish the growth of 32 of them in litmus milk; even the cultures that grew were slow to form a clot, 1 reacting in one day, 17 in two days, and 8 in three days. The reaction may also be positive in the absence of *Cl. welchii*, especially with mixtures of aerobes and anaerobes. Nagler's (1939) reaction—the production by *welchii* toxin of turbidity and sometimes a fine curdiness in human serum—constitutes a possible diagnostic test for *Cl. welchii*. The reaction, being inhibited by *welchii* antitoxin, has the great advantage of being serologically specific.* It has been found valuable in routine diagnostic bacteriology of war wounds infected with *Cl. welchii*.

The reaction of a typical *Cl. welchii* and the technique finally adopted to elicit it are as follows. To one of two sterile 6-mm. (Wassermann) tubes is added 0.3 c.cm. of a mixture of equal volumes of human serum and Fildes's peptic blood digest broth; to the other tube, a control, 0.3 c.cm. of a similar mixture containing in addition 10% of concentrated *welchii* antitoxin. These test and control mixtures are conveniently made in bulk and kept at 2° C. Each tube is inoculated either with a drop of culture or with half the suspected *welchii* colony, and is observed after sixteen, forty, and sixty-four hours' anaerobic incubation at 37° C. If the reaction is positive the serum becomes turbid, and in strong reactions there appears a fine yellowish curd, which tends to float on the surface of the fluid. On spinning, three zones are seen—a compact deposit of bacilli, a more or less compact scum of fat-like material, and an intermediate fluid that is either turbid or clear, apparently depending on the packing of the fatty material in the top layer. When only a small amount of toxin is produced spinning does not cause the formation of a scum, but the fluid above the bacterial deposit is turbid. Reactions are recorded ++ or + according to whether or not a well-defined top layer is formed. The control tube shows turbidity due to bacteria only, which on spinning form a compact deposit at the bottom of a column of clear fluid.

In the hope of simplifying the technique several methods of eliciting the reaction with living cultures have been tested by both quantitative and qualitative methods. In the first the test fluids were inoculated with graded inocula of *Cl. welchii*, viable-counted by the method of Miles and Misra (1938). In the second—"the colony test"—the test fluids were sown with single colonies varying from 0.3 to 1.7 mm. on sixteen-hour blood-agar plates. A 0.9-mm. colony was found to contain 4,000,000 living organisms, so that these inocula were of the order of a million living bacilli. All tests were made with appropriate antitoxin-containing controls. The single-colony inoculum was adopted as representing most nearly the conditions of routine bacteriological testing.

Reagents and Conditions of the Test

Human Serum.—Different serum samples vary in sensitivity even when they are from one person. For example, the minimal inocula of a standard culture giving a positive reaction with three specimens of serum from one person were 400, 3,000, and 200,000 viable bacilli. However, all sera tested have been sensitive enough for use with single-colony inocula. Nagler recommends inactivation, but this is not necessary; indeed, in 5 of 12 colony tests inactivated serum proved slightly less sensitive than fresh serum. Macfarlane *et al.* (1941) and Nagler (1941) find that a suspension of hen-egg yolk in saline is more sensitive than human serum to toxin. Yolk saline, even when mixed with Fildes's broth, proved in 7 of 16 colony tests to be a poor growth-promoter of *Cl. welchii*, and the Nagler reactions with living cultures were consequently much feebler than those with the broth-serum mixture.

Antitoxin.—Concentrated gas-gangrene antitoxin *(perfringens)*, with a minimum of 730 units per c.cm., prepared by the Lister Institute, was used throughout the tests.

Broth.—Nagler (1939) found that some strains of *Cl. welchii* grow only when broth is added to human serum. Comparative tests were made on serum mixed with nutrient broth (tryptic digest of ox heart) alone, and enriched with Fildes's extract or with 2% glucose. The superiority of Fildes's broth over nutrient broth for promoting growth is evident in Table I. This was confirmed in colony tests of 15 strains, when nutrient broth failed to promote

* Seiffert (1939) has described a similar flocculation in human serum to which *welchii* toxin has been added. This may be the same phenomenon, but since Seiffert specifically states that his reaction is not inhibited by antitoxin it must be assumed that the phenomenon is different. Nagler's name has accordingly been applied to the test investigated in this paper.

TABLE I.—*Nagler Reactions in Nutrient and Fildes's Broth*

Inoculum (approx.)	Nutrient Broth			Fildes's Broth		
	Serum M	Serum C	Serum H	Serum M	Serum C	Serum H
3×10^5	++	++	++	++	++	++
3×10^4	−	−	−	++	++	++
3×10^3	−	−	−	−	++	++
3×10^2	−	−	−	−	++	−
3×10^1	−	−	−	−	−	−

adequate growth of 7, whereas all grew excellently in Fildes's and glucose broth. Fildes's broth was adopted in the standard test, since glucose broth gave feeble reactions and sometimes induced an important modification in the positive reaction (see heading " Potato and Iron," below).

" Aerobic Incubation."—In view of the difficulties attending constant manipulation of anaerobic jars, attempts were made to induce the reaction in air by modifying the broth with substances lowering the oxidation-reduction potential and by the use of paraffin seals.

Modified Brewer's Medium.—The addition of 0.05% agar and 0.01% sodium thioglycollate (Brewer, 1940) to the Fildes's broth - serum mixture permitted the aerobic growth of single colonies of all the strains (25) of *Cl. welchii* tested, and the reactions paralleled those incubated anaerobically. However, as Table II shows, growth

TABLE II.—*Nagler Reactions in Aerobic Cultures*

Inoculum (approx.)		Broth and Atmosphere				
Strain T	Strain S	F, Anaer	F, Aer	F+T, Aer	F+T, Aer	F+T+A, Aer
3×10^6	4×10^6	++	−	−	++	++
3×10^5	4×10^5	++	−	−	−	−
3×10^4	4×10^4	++	−	−	−	−
3×10^3	4×10^3	++	−	−	−	−
3×10^2	4×10^2	++	−	−	−	−

F=Fildes's broth. A=0.05% agar. T=0.01% sodium thioglycollate. Anaer=anaerobic. Aer=aerobic.

is established aerobically only from large inocula. The low sensitivity of the medium does not compensate for the relative ease of its incubation.

Potato and Iron.—Nutrient broth containing a small piece of autoclaved potato was no more effective than the modified Fildes broth in supporting aerobic growth. On the other hand, Fildes's broth was made highly sensitive by the addition of a 4 by 7 mm. strip of No. 26 gauge black stove-pipe iron (cf. Spray, 1936). One of three quantitative tests is given in Table III. The positive

TABLE III.—*Nagler Reaction in Iron-Fildes's Broth and Fildes's Broth*

Inoculum (approx.)	Iron-Fildes's Broth		Fildes's Broth	
	Extent of Growth	Nagler Reaction	Extent of Growth	Nagler Reaction
8×10^5	++	(++)	++	++
8×10^4	++	(++)	++	++
8×10^3	++	(++)	++	++
8×10^2	++	(++)	++	+
8×10^1	++	(++)	+	−
8×10^0	++	+	±	−

Nagler reactions in the iron broth are recorded in brackets because, although the difference in turbidity between the test and control mixtures was pronounced, test and control both yielded a clear supernatant fluid on spinning. The deposit was, however, much larger in the test mixture. Potato has the same effect. From the few tests made it appears that, under the conditions of growth stimulated by 2% glucose (see above), potato, or iron, the flocculent material manifested by the action of toxin has a higher specific gravity than that produced in the Fildes mixture, and is consequently thrown down by the centrifuge. With four strains of Type A *Cl. welchii* and one of Type C *Cl. welchii* tested anaerobically in Fildes's broth - serum mixture, the floccules, which initially rose as a scum on spinning, with a further twenty-four hours incubation changed in specific gravity and sedimented instead of rising.

Liquid paraffin seals failed to induce satisfactory growth in any of the test mixtures incubated in air.

The iron - Fildes's broth - serum mixture alone of the attempted modifications is highly sensitive for aerobic Nagler tests. Unfortunately the ready sedimentation of the floccules makes the detection of slight reactions impossible, for only gross differences between the test and control centrifuged deposits are evident. The improvement of this " aerobic " test is under investigation.

Inoculum.—Since the Nagler reaction is due to the toxin, and the amount of toxin produced is directly related to the extent of growth, the minimum inoculum necessary for a strong reaction will depend on the rate of growth of the strain in the medium provided, on the toxigenic powers of the strain, and on the sensitivity of the human serum used. The quantitative experiment recorded in Table IV shows the effects of size of inoculum and of

TABLE IV.—*Difference in Growth Rates of Welchii Strains in Nagler Reactions*

Strain	Inoculum (approx.)	Time of Incubation			
		16 hours		40 hours	
		Extent of Growth	Nagler Reaction	Extent of Growth	Nagler Reaction
A71	8×10^6	++	++	++	++
	8×10^5	++	++	++	++
	8×10^4	++	++	++	++
	8×10^3	++	++	++	++
	8×10^2	++	++	++	++
	8×10^1	++	−	++	++
A72	3×10^6	++	++	++	++
	3×10^5	++	++	++	++
	3×10^4	+	±	++	++
	3×10^3	±	−	++	++
	3×10^2	−	−	−	−
	3×10^1	−	−	−	−

difference in growth rates of two strains on reactions in the same serum. Table V gives the reactions of single-colony inocula of three typical strains—a slow, a moderate, and a rapid grower. A definite threshold value for the

TABLE V.—*Single-colony Nagler Reactions of Slowly, Moderately, and Rapidly Growing Welchii Strains*

Strain:	7730			Sand 6			S13		
Time of incubation (hours) ..	16	40	64	16	40	64	16	40	64
Extent of growth	±	+	++	+	++	++	++	++	++
Nagler reaction	−	±	++	±	++	++	++	++	++

quantity of toxin which is necessary to give a reaction is apparent: a toxigenic strain may not react if the growth is poor. In a series of twelve quantitative tests with four different cultures and sera from three persons the number of viable organisms necessary to give a strong positive reaction ranged from 30 to 200,000. Since this is rather less than the number of viable organisms in an average-sized colony of *Cl. welchii* (4,000,000), a single colony should be a sufficient inoculum for a Nagler test. In colony tests of 58 strains, 47 grew well and gave strongly

positive reactions—31 in sixteen hours and 16 in forty hours. Six grew poorly, but on repeating the tests they all grew well and gave strongly positive reactions in forty hours, one requiring a more concentrated inoculum. A further 5 reacted feebly, although they grew well; on retesting with another serum 3 of these reacted strongly but 2 remained weak reactors. In routine practice the colony test was applied to 43 plates directly seeded from wound swabs or dust. Of these, 20 reacted strongly in sixteen hours and 15 in forty hours. Nine grew poorly, but growth was sufficient to give a definite reaction in all but two of them. These two were strongly positive when retested with a drop of broth culture as inoculum.

Incubation and Centrifugation.—Most strains are positive in sixteen or forty hours, and a few require sixty-four hours' incubation; but no change has been observed after sixty-four hours. Strong reactions are obvious without spinning, but the detection of weak reactions and the confirmation of negatives are impossible without a comparison of centrifuged tests and control tubes. It should be noted (see above) that a floating mass of floccules may be changed to a sedimenting precipitate with prolonged incubation of the test mixture.

Reactions with Cl. welchii

Fifty-eight strains have been tested: 3 stock cultures (one each of Types A, B, and C), and 55 recently isolated cultures—51 from wounds in 39 persons and 4 from sand and air. Nine of the wound strains were kindly sent by Dr. E. T. C. Spooner. Of the 46 strains isolated in this laboratory 45 were identified as *Cl. welchii* on morphological, cultural, and biochemical characteristics. Many were tested in guinea-pigs and mice, with antitoxin controls. One strain, even after repeated purification, slowly digested and blackened meat broth persistently, and fermented salicin but not sucrose; it gave typical disease in the guinea-pig and killed a normal but not an antitoxin-treated mouse. Of these 58 strains 56 (96%) gave strong reactions when the growth was good. Two grew well, but reacted feebly with serum from young adults, although they reacted strongly with a senile serum. One of these—beta-haemolytic on horse-blood agar, and pathogenic for guinea-pigs but not mice—reacted strongly with yolk saline. The other was non-haemolytic and non-pathogenic, and reacted feebly with yolk saline. These reactions, though feeble, were definite and were inhibited by antitoxin, but in view of the "specific" reaction by other clostridia cannot be considered as exclusively characteristic of *Cl. welchii*.

Reactions with Other Bacteria

Anaerobes.—Tests have been carried out on 174 cultures of anaerobes other than *Cl. welchii*. These included 67 of the *Cl. sporogenes* type, 6 *Cl. septicum*, 10 *Cl. tetani* of different serological types, 2 *Cl. multifermentans tenalbus*, 1 each of *Cl. botulinum*, *Cl. sphenoides*, *Cl. histolyticum*, *Cl. tetanomorphum*, *Cl. oedematiens*, *Cl. bifermentans*, N.C.T.C. 2914, *Cl. sordellii*, N.C.T.C. 2919, *Cl. parasporogenes*, *Cl. centrosporogenes*, N.C.T.C. 1341, *Cl. fallax*, and *Cl. hastiforme*, 66 not yet fully identified proteolytic anaerobes, 11 not yet fully identified saccharolytic anaerobes which by reason of spore position, colony form, or sugar reactions were known not to be *Cl. welchii*, and an anaerobic coccus. Of these, 165 gave no Nagler reaction, although some gave a slight turbidity in both test and control tubes. The remaining 9 cultures were feebly but definitely positive, the reaction being inhibited by *welchii* antitoxin, and appearing both in yolk saline and in serum. On human serum-Fildes's-agar plates they produced a well-defined opacity extending to a distance of about 2 mm. from the edge of the colony. Two were N.C.T.C. strains—*Cl. sordellii* and *Cl. centrosporogenes*. Seven were recently isolated from wounds; they were all very similar and were most nearly related to *Cl. bifermentans*, although some differed from it in motility, action on Spray's iron milk (1936), and liquefaction of inspissated serum. None fermented the two *welchii* sugars—lactose and sucrose. Although the cultures had been thoroughly purified by alternate broth and plate subcultures, it is possible that the positive reactions were due to contamination with small amounts of *Cl. welchii* whose growth was enhanced in the Nagler test fluid at the expense of the predominating clostridium. Serial subculture in this fluid improved the Nagler reaction to a certain extent, but all attempts to reveal traces of *Cl. welchii* in the subcultures of these strains have so far failed. With all 7 cultures large doses mixed with calcium chloride failed to kill mice or guinea-pigs. On the whole the similarity of these cultures and their persistent non-*welchii* characters in media favouring the growth of *Cl. welchii* suggest they are non-*welchii* Nagler-reacting clostridia. Nevertheless the fact that all but 2 of the cultures came from wounds that contained *Cl. welchii*, and the impossibility of establishing the absence of *Cl. welchii* in the cultures without the use of a single-cell culture method, at present preclude a definite answer. All that can be said with certainty is that a feeble Nagler reaction is given by a few cultures in which it has so far proved impossible to demonstrate *Cl. welchii* by ordinary bacteriological technique. In the light of this fact the appearance of a feeble reaction must for the present remain inconclusive.

Aerobes.—In routine tests, 3 haemolytic aerobic spore-bearers were Nagler-tested; 2 were feebly positive.

Value of the Test and its Interpretation

Well-defined strongly positive Nagler reactions reliably indicate *Cl. welchii*, and the test is an exceedingly useful addition to the routine litmus milk tests. It is much more easily elicited than the stormy clot. When single colonies are used as inocula 80% of strains of *Cl. welchii* give a strongly positive Nagler reaction on first testing, whereas only 45% give a stormy clot in litmus milk. Spray's iron milk (1936) is more sensitive than litmus milk, but the "stormy clot" is produced in this medium by a number of other clostridia—namely, *Cl. aerofoetidum*, *Cl. butyricum*, *Cl. multifermentans*, and occasionally *Cl. sphenoides*, *Cl. fallax*, *Cl. tertium*, and *Cl. septicum*. Hence the reactions in both milk media are less reliable than a well-defined Nagler reaction, which has the advantage of being serologically specific.

The test is effective, simple, and easy to apply, and yields results quickly with small amounts of materials. It cannot be used as the sole confirmation of an identification based on individual and colonial morphology because the feeble reactions given by some *welchii* strains are inconclusive.

A mixture of equal parts of Fildes's broth and human serum is preferred for the test. Being more sensitive to *welchii* toxin, yolk saline is a possible substitute for human serum, but it appears to be a poorer supporter of growth. Single-colony inocula are large enough for Nagler tests of all but the very poorest growers. They should be incubated until positive or up to three days; and they should not be recorded as negative until the growth has been good for at least two days. Centrifugation is necessary for accurate reading, but, in view of the occasional change in the specific gravity of the flocculent material, tubes must be read daily both before and after spinning.

For routine rapid identification the test should be applied to any colony suspected of being *Cl. welchii*, for there is a very good chance of obtaining a result in twenty-four hours. At the same time as the Nagler test is set up, a meat-broth culture should be sown and, if the first test is negative in twenty-four hours. used for a heavy

inoculum in a second test. This will probably yield a result by the second day. The test thus affords a method by which a positive specific result may be obtained within two or perhaps three days of taking the specimen.

Nagler reactions may be obtained on solid media. On Fildes's agar containing 10 to 20% human serum sixteen-hour colonies of *Cl. welchii* are surrounded by clearly defined zones of marked opacity 2 mm. wide. With longer incubation the zones extend, often up to 8 mm. By the addition of 4 units of *welchii* antitoxin per c.cm. of medium the formation of the zone is completely inhibited. (On antitoxin medium of this strength a few colonies of one *welchii* strain produced a thin ring of opacity about 0.2 mm. wide and about 1 mm. from the colony, apparently in the depth of the medium; it was completely inhibited by 24 units of antitoxin per c.cm.) The 7 Nagler-reacting cultures of *Cl. bifermentans* type, and the N.C.T.C. strains *Cl. sordellii* and *Cl. centrosporogenes*, produced a similar opacity, which sometimes required forty hours' incubation before developing; in confirmation of the finding of Cook (personal communication) *Cl. oedematiens* produced a similar neutralizable zone; all other anaerobes tested produced none at all. This adaptation of the Nagler reaction to a solid medium has already proved a useful means of detecting *Cl. welchii* within twenty-four hours of taking the swab. Test plates are more sensitive than test fluids; great caution must therefore be exercised in the interpretation of feeble or slowly developing plate reactions. A control antitoxin-containing plate is essential.

Summary and Conclusions

The production of a turbidity in human serum by the toxins of growing *Cl. welchii* (Nagler reaction) is a valuable aid to the rapid identification of the bacillus for diagnostic purposes. Excellent results are obtained with a mixture of equal parts of human serum and Fildes's broth incubated anaerobically. The seeding of a single *welchii* colony into such a mixture produced a strong reaction in 80% of the tests after one to two days' incubation. The reaction is specifically inhibited by antitoxin. Feeble reactions are not unequivocally indicative of *Cl. welchii*, since they are given by certain other species of anaerobic spore-bearer. Human serum - Fildes's - agar provides a means of detecting *Cl. welchii* on plates within twenty-four hours of taking a swab.

I am greatly indebted to Dr. Herta Schwabacher and Dr. A. C. Cunliffe for their help with tests of wound anaerobes; to Dr. E. T. C. Spooner for *welchii* strains; to Dr. C. R. Amies of the Lister Institute, Elstree, for antitoxin; to Dr. R. St. John Brooks, Major MacLennan, and many others for strains of clostridia; and to Prof. A. A. Miles for interest and advice. The work was made possible by a personal grant from the Medical Research Council.

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M. Kobro and P. Owren (*Norsk Med.* 1941, **9**, **447**) state that trichinosis had not been seen in Norway since 1882 until the summer of 1940, when an outbreak of seven undoubted cases occurred at Strömmen, near Oslo. Six showed the classical symptoms of the disease, such as oedema of the eyelids, gastro-intestinal disturbance, stiffness of the muscles, pronounced eosinophilia, and fever. One had atypical clinical symptoms with gastro-intestinal manifestations, but with albuminuria and haematuria. The cause of the epidemic was the consumption of inadequately cooked pork. All recovered.

THE AFTER-TREATMENT OF PARAPLEGIC PATIENTS FOLLOWING INJURIES TO THE SPINE

BY

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As the result of air raids there must now be in this country more cases of paraplegia following wounds and crushing injuries to the spinal column than ever before, especially amongst the civilian population. The immediate treatment of these most serious injuries is well known, but it may be emphasized that in first moving such cases it is wise to place the patient in the prone position on a stretcher or other means of transport, to prevent further crushing of the cord.

It is the after-treatment that is so important—that is, when the patient, having recovered from shock, having perhaps had a laminectomy performed to remove spicules of bone or to relieve pressure from the cord, having in many cases, especially among the males, had cystotomy, with suprapubic drainage and the like, has settled down and become accustomed to a paraplegic existence. After complacency has been established, life in these cases is not necessarily miserable, but it is full of surgical and medical pitfalls, the avoidance of which is essential to the preservation of a reasonable degree of comfort.

Let us, then, consider the treatment when the spinal injury has not resulted in speedy death. A very small proportion of these patients recover completely; but most of them remain paralysed, and in these cases the after-treatment here to be suggested will enable them to be comparatively free from pain, to enter happily into sedentary occupations and games, and to be mentally normal. The essentials are: (1) to ensure against infection of the urinary tract; (2) to guard against trophic ulcers and bed-sores; (3) to mitigate the serious discomfort of the incontinences; and (4) to make provision for adequate sleep and deal with mental anxieties by giving suitable sedative medicines.

Infection of the Urinary Tract

The "end" condition in nearly all paraplegics is a pyelonephritis with uraemia (in the absence of intercurrent disease, to which they appear to be no more subject than normal individuals). Patients often present a condition of retention with overflow, and these cases call for suprapubic cystotomy, which they usually get. But there has been a practice of inserting through the suprapubic opening a de Pezzer or Malecot drainage tube and letting it do its own work quite indefinitely, without daily irrigation of the bladder and frequent removal and sterilizing of the tube.

All such cases develop a mixed infection of the urine, very many have bladder calculi, and most have a pyelitis. Here we cast out these self-retaining tubes and insert a 12-inch or 16-inch sterilized Jaques catheter into the suprapubic wound. Another catheter is placed daily in the urethra and connected with a tube from an irrigator, which is hoisted about 2 feet 6 inches above the bladder, and the "wash-out" with boric or some similar lotion is carried out via the urethra, through the bladder, and out by the suprapubic tube. This is a reversal of the usual method of irrigation, but many years of experience have convinced me, of its efficacy. A fresh suprapubic tube is now inserted, being fixed by strapping to the abdominal wall; it is then connected by a double clip with another tube leading to a urine bottle attached

to the side of the bed. When these patients are up in their wheel-chairs or hand-propelled tricycles the tube is connected with a rubber urinal suspended from the waist and strapped on to the leg. As most of these patients have no feeling below their lesion the removal of calculi from the bladder is easy and does not call for an anaesthetic.

The daily toilet of the bladder is the essential detail in the treatment of paraplegics. Most cases are given mixtures as follows: (*a*) 20 grains of acid sodium phosphate in one ounce of water thrice on one day, followed by (*b*) 10 grains of urotropine in water thrice on the next day; and so on indefinitely on alternate days.

Trophic Ulcers and Bed-sores

A trophic ulcer is due to lack of circulation or to deficient innervation of the skin. A bed-sore is a nursing crime. We do not have bed-sores in this Home! A trophic ulcer is an inevitable occurrence and cannot be healed, but it can be kept surgically clean.

When a paraplegic patient arrives he must be put to bed, using fracture boards, an air bed, or, better still, a "dunlopillo" mattress, and at once his palsied limbs must be placed in the optimal position by means of cushions, sandbags, and the like, to avoid hyperextension or hypercontraction. The usual daily nursing measures must be adopted for the health and preservation of the skin, especially in those parts subject to pressure. A bed-cradle should always be used to keep the weight of bedclothes off the badly nourished and paralysed lower extremities. Remember that the patient can feel nothing "below the belt"; it is therefore imperative that constant watch be kept on the sacral region, the hips, and the lower extremities, so that any redness or excoriation may be treated without delay.

When the vertebral lesion has consolidated—say some eight to twelve months after the injury—it is well to encourage the paraplegic to sit up and get about in a wheel-chair or a hand-propelled or motor tricycle; but these patients must have padded seats and plenty of cushions to protect their not too well nourished seating apparatus. At this period, too, we advocate two or three baths a week. This does them good; it stimulates the peripheral circulation and relieves the kidneys of some of their burden. We have our baths at right-angles to the walls so that an orderly on each side can expedite and assist in the process.

Massage certainly increases the cutaneous and muscular tone, and even after years of disability it conserves hope and at any rate induces the patient to feel that something is being done. *Electrotherapy* I do advise in the early stages, and until it has been conclusively ascertained which groups of muscles are worthy of notice and therapeutic attack, but I consider that to continue electric treatment to irresponsive muscles is a waste of time and electricity.

The Incontinences

Incontinence of Urine.—In the male this is readily managed by the provision of a recognized pattern of rubber urinal having a penile sheath connected with a tube to a container which is strapped to the leg and emptied by a tap near the ankle. For the female I fear there is no adequate provision. The few cases of urinary incontinence in women that I have met with have been difficult to deal with adequately, and in spite of all sorts of apparatus and trials the condition is likely to be appalling. No doubt something will soon be done about this: it is very urgent.

Rectal Incontinence.—When these paraplegics have as it were settled down—say a year or two after their wounds—and they are able to get about in chairs and tricycles, we have found that a weekly or bi-weekly day in bed is most useful. We call these "enema" days—when patients are given a high colonic injection of water, soap, and turpentine to empty the large bowel; this enables them to exist the remaining days of the week without incontinence. They can therefore go to entertainments, cinemas, etc., with almost complete confidence that there will be no unpleasant happenings.

Shock, Sleep, and Pain

In the early stages enough sedatives must be given to counteract shock, which is intensified by the contemplation of years of inaction and invalidism. Bromides are valuable. If these do not work, morphine may be necessary; but it is so easy for the paraplegic to become a morphine addict that I seriously counsel the withholding of its use unless pain is unbearable.

These people must have sleep: dial, adalin, soneryl, and all sorts of others may be used, but you may finally have to resort to morphine.

Conclusion

There are two points to remember: (1) in the initial stage the freeing of pressure on the spinal cord by laminectomy; (2) the unremitting nursing care of the whole body of the patient, and especially the daily toilet of the urinary tract, which of itself can prolong life for these unfortunate people.

After nearly seventeen years in charge of this Home for Paraplegics and after many years of direction in the management of these cases by the late Sir John Thomson-Walker, I feel that perhaps I may be forgiven for appearing didactic.

INTRAVENOUS ANAESTHESIA IN OBSTETRICS

BY

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In general practice, especially in times like these, obstetric operations have usually to be conducted with only the nurse or midwife as assistant. The difficulty and anxiety so often experienced with inhalation anaesthesia under these conditions led me, some four years ago, to a trial of intravenous anaesthesia as an alternative. It seemed to me that this method would add enormously to the patient's comfort, while at the same time it would very largely free the nurse, who, being relieved of the duties of anaesthetist, would be able to supply that extra pair of hands so invaluable.

Choice of Evipan

Evipan was chosen because it had been employed freely in all kinds of case. I used this drug throughout this series, having found no reason to change it.

I first tried evipan in cases needing repair of the perineum, and it gave complete satisfaction. I then employed it in low-forceps operations. I have given it in over 50 cases, and only once have I had to reinforce anaesthesia with open ether. The ideal case is that in which the head is on the perineum, when, with the aid of a small pair of forceps, such as those used and described by Wrigley, labour can safely be shortened. It was in just such a case that the unpleasantness and inconvenience of open ether or chloroform seemed often to outweigh the relief and advantages to patient and practitioner alike.

Some of the more difficult obstetric operations have also been carried out with evipan, with complete satisfaction so far as anaesthesia is concerned. One patient, a primi-

para, was delivered of a breech with legs extended, a leg having to be brought down. The child did very well, and the mother suffered no undue shock. In 3 cases persistent occipito-posterior positions have been manually rotated and delivery made with forceps, without undue hurry being experienced, and neither mother nor child appeared to suffer in any way.

In 6 cases the head was found to be unexpectedly "tight," and considerable traction was required to deliver the child. In 4 of these a perineal tear resulted, but this was repaired without any additional anaesthetic.

Evipan has been given, in rather smaller dose, to 7 patients just before the birth of the head, when forceps were not used. In one case trouble was experienced with the child after delivery—there being some delay in respiration. In the other 6 cases the children cried at once and there were no neonatal complications. In no case was there any excessive post-partum bleeding, and the placenta always appeared to separate quickly and easily.

Description of Technique

The technique which is now adopted has been modified with increasing experience, and I hope that the following brief description may be of value to others.

Having decided to deliver the patient, she is placed in the left lateral position and obstetric aid straps are applied. The type used has been that described by C. J. Penny (1933): one strap encircles the abdomen and is affixed to the head of the bed; the other holds the patient's hips flexed and passes over her neck. The buttocks and perineum are then thoroughly swabbed with dettol cream, and a swab covered liberally with dettol cream is left in the vagina.

The operator, gowned and masked and with bare washed hands, is now ready to administer the evipan. A prop is placed between the patient's jaws, and the nurse, standing by her head, helps in steadying the arm: a firm grip above the elbow will make the veins in the antecubital fossa more obvious. In every case 10 c.cm. of the 10% solution of evipan has been used. The first 3 or 4 c.cm. is injected quite quickly, and after a pause the remainder of the dose is given rather more leisurely —about a minute being taken over the whole procedure. In all my cases I have had the help of only the nurse or midwife; she remains at the patient's head, holding the chin well forward, and from the same position she is able later to support the patient's right leg by taking hold of the strap.

The operator now re-washes his hands and dons sterile gloves. The dettol cream swab is extracted from the vagina and is used for one last application to perineum and buttocks. Sterile towels are then used to cover exposed areas, after which a catheter is passed, the receiver being held by the nurse, who has it ready beside her. At this stage the forceps are applied to the child's head and the extraction is carried out in the ordinary way. When there has been the need for earlier sedation by chloral and bromide, or morphine, a very complete anaesthesia has been experienced, with a patient perfectly still. In one or two cases in which there has been no previous medication slight movement of the legs has been experienced, and it is for this reason that the obstetric straps are advised, for with them I have never been in any way inconvenienced by this tendency to move.

As has already been said, the children give no trouble; the third stage is passed rapidly, and the patient is usually recovering consciousness by the time one is ready to leave her. One of the ergot preparations is injected after the birth of the placenta, and it is always my practice to record the systolic blood pressure before leaving the patient. Readings of under 100 mm. Hg (which have not been met with in this series) should be taken as a warning of incipient shock and should be countered by the usual methods.

During the past six months this method of anaesthesia has been adopted by Dr. C. J. Penny, honorary obstetrician to the Royal Hampshire County Hospital. He tells me that he has used it in over 20 cases, and that it has been uniformly satisfactory.

Summary

The advantages of intravenous anaesthesia in the easier obstetric operations are discussed.

In over 50 cases in which evipan sodium in 1-gramme doses has been used it has given entire satisfaction, and there have been no complications in the progress of mother or child.

A brief account of the technique is given.

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EFFECT OF BENZEDRINE ON THE OCULOGYRIC CRISES OF PARKINSONISM

BY

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In the last few years several articles have appeared in American medical journals reporting the beneficial results which may be expected when benzedrine is administered in conjunction with stramonium or hyoscine to cases of post-encephalitic Parkinsonism (Solomon, Mitchell, and Prinzmetal, 1937; Finkelman and Shapiro, 1937; Matthews, 1938; Davis and Stewart, 1938). Of the symptoms discussed it would appear that oculogyric crises react best to this treatment—in fact, three of the four articles referred to claim that this symptom was relieved in every case in which it occurred.

The investigation described below was carried out on patients at the National Hospital for Nervous Diseases, Queen Square, and at the Royal United Hospital, Bath, in an attempt to reproduce these uniformly good results. It is impossible to control an investigation of this type accurately, certain criticisms of the dosage, and the shortness of the period of observation in some cases, being bound to arise. It is felt, however, that by concentrating on an isolated symptom, such as the oculogyric crisis, which can be recorded by the patient, a more accurate impression of the effect of benzedrine on post-encephalitic Parkinsonism will be obtained than by considering rigidity, tremor, or sleep disturbance, which are obviously more difficult to assess.

Seventeen patients were observed while under treatment with stramonium, hyoscine, or some similar drug, and a record was kept of their oculogyric attacks over periods ranging from two to twelve weeks. Benzedrine was then given in various doses up to 30 mg. a day in addition to the previous treatment, and the attacks were again recorded over similar periods. In two cases benzedrine was given alone.

In the table the average number of attacks per week is stated, as it is considered that this method will give the most accurate comparison between the cases. It should be realized, however, that in patients showing a small number

of attacks this figure will not give such a true indication of the response to treatment as in those with a larger weekly average.

Summary of Results

The results of the 17 cases treated were as follows: good, 4 (23.5%); moderate, 5 (29.4%); poor, 8 (47.0%).

Table of Results

No.	Sex and Age	Treatment	Average No. of Attacks per Week	Remarks	Result
1	M. 20	Extr. stramon. sic. 0.25 mg., q.d.s.	3.0		
		Original treatment + benzedrine 10 mg. b.d.	1.4	No improvement in other symptoms	Moderate
		Original treatment only	2.5	Stated that he missed benzedrine	Relapse when benzedrine stopped
2	F. 31	Placebo	1.3		
		Tr. stramon. ℥xxx, tr. nucis vom. ℥x	0.75		
		Above treatment + benzedrine 10 mg. b.d.	1.25	Attacks of shorter duration	Nil
		Benzedrine increased to 15 mg. mane, 10 mg. midday	1.0		Increase in attacks when benzedrine stopped
		Tr. stramon. and tr. nucis vom. only	5.0		
3	M. 35	Extr. stramon. sic. 0.25 mg. b.d.	1.83	B.P. 165/105	
		Original treatment + benzedrine 5 mg. b.d.	1.33	Dizziness if benzedrine taken on empty stomach. Thought he was much improved	Nil
		Original treatment only	1.33	Said there was not much difference when benzedrine stopped	
4	F. 19	Tr. stramon. ℥xxx, ac. hydrobrom. dil. t.d.s.	1.0		Good
		Original treatment + benzedrine 10 mg. b.d.	0.25	General improvement	Some improvement maintained when benzedrine stopped
		Original treatment only	0.5	Said she missed benzedrine	
5	M. 22	Hyosc. hydrobrom. gr. 1/100, atropin. sulph. gr. 1/250, tr. stramon. ℥xxv, t.d.s., luminal gr. 1/2 b.d.	2.0		Good
		Original treatment + benzedrine 10 mg. b.d.	1.25	Said benzedrine improved symptoms, but did not miss it when it was stopped	Improvement maintained when benzedrine stopped
		Original treatment only	1.5		
6	F. 22	Hyosc. hydrobrom. gr. 1/100 t.d.s.	0.67	B.P. 150/75	
		Original treatment + benzedrine 10 mg. b.d.	1/1.33	Did not take benzedrine regularly. Morning headache while taking it	Nil
		Original treatment only	0.67		
7	M. 23	Tr. stramon. ℥xlv t.d.s.	1.5	Attacks lasted 1 hour each	Moderate
		Original treatment + benzedrine 5 mg. b.d.	1.1	The majority of attacks lasted ½ hour each	Improvement maintained when benzedrine stopped
		Original treatment only	1.0	Said tremor was worse without benzedrine	
8	F. 27	Extr. stramon. sic. 0.25 mg. t.d.s.	2.5		
		Original treatment + benzedrine 5 mg. b.d.	1.5		Ditto
		Original treatment only	1.62		
9	M. 27	Tr. stramon. ℥lx, hyosc. hydrobrom. gr. 1/100, t.d.s.	2.0		
		Original treatment + benzedrine 10 mg. b.d.	1.25		Moderate
		Benzedrine increased to 15 mg. mane, 10 mg. midday	1.5		Improvement on benzedrine and stramon. and hyosc.
		Benzedrine 15 mg. mane, 10 mg. midday, given alone	3.0		Worse on benzedrine alone
		Original treatment + benzedrine 15 mg. mane, 10 mg. midday	2.0	No attacks for 14 days, then 4 attacks in 14 days	Improvement maintained when benzedrine stopped
		Original treatment only	0.75		

Table of Results (continued)

No.	Sex and Age	Treatment	Aver. No. of Attacks per Week	Remarks	Result
10	F. 19	Hyosc. hydrobromide gr. 1/150, tr. stramon. ℥lxxx, tr. nucis vom. ℥iv, t.d.s., luminal gr. 1/4 nocte	0.75	Took benzedrine irregularly for part of time, but stated that attacks were improved. No worse without benzedrine	Nil
		Original treatment + benzedrine 10 mg. b.d.	1.0		
		Original treatment only	0.87		
11	F. 29	Tr. bellad. ℥vii, tr. stramon. ℥xv-xxv t.d.s.	Almost daily	B.P. 145/90. Mitral stenosis	Good
		Benzedrine 5 mg. b.d. only	3.7	Pain in chest like dyspepsia 2 hours after benzedrine	Improved on benzedrine only. Still more improved on benzedrine, belladonna, and stramonium. Relapse on stopping benzedrine
		Original treatment + benzedrine 5 mg. b.d.	1.7		
		Original treatment	Almost daily		
		No treatment	,,		
12	F. 48	Extr. stramon. sic.	2.5		
		Original treatment + benzedrine 10 mg. b.d.	2.5		Nil
		Original treatment + benzedrine 15 mg. mane, 10 mg. midday	2.25 (?)	Unreliable record kept by patient	
		Original treatment only	2.2		
13	M. 26	Tr. stramon. ℥x hyosc. gr. 1/200	0.75 slight 0.33 severe		
		Original treatment + benzedrine 10 mg. b.d.	0.53 slight 0.18 severe		Good
		Original treatment + benzedrine 15 mg. mane, 10 mg. midday	0.33 slight 0 severe		Relapse on stopping benzedrine
		Original treatment only	0.5 slight 0.33 severe		
14	M. 22	Tr. stramon. ℥xx t.d.s.	2.0	History of head injury W.R.++++	
		Original treatment + benzedrine 10 mg. b.d.	2.5		Nil
		Original treatment + benzedrine 15 mg. b.d.	2.5		
		Original treatment only	3.0		
15	M. 27	? ?	Several daily		
		Original treatment + benzedrine 10 mg. b.d.	Worse	Sleepless	Moderate
		Original treatment + benzedrine 5 mg. b.d.	3.4	Still sleepless	Best result with small dose of benzedrine
16	F. 22	Acid. hydrobrom. dil. ℥v, tr. lobelia ℥v, tr. stramon, ℥cxx t.d.s., tab. luminal gr. 1/2 nocte	6.5		
		Original treatment + benzedrine 10 mg. b.d.	6.0		Nil
		Original treatment + benzedrine 15 mg. mane, 10 mg. midday	7.25		
		Original treatment only	6.0		
17	M. 22	Hyosc. gr. 1/100 b.d.	1.0		
		Original treatment + benzedrine 5 mg. b.d.	0.75	Palpitation	
		Original treatment + benzedrine 10 mg. b.d.	0.75	Pulse 136, B.P. 125/70. No cardiac enlargement, but had a generalized systolic murmur and accentuated pulmonary second sound. Tachycardia persisted some months. Signs suggested mitral regurgitation	Nil
		Original treatment + benzedrine 10 mg. mane, 15 mg. midday	0.75		
		Original treatment + benzedrine 15 mg. b.d.	1.0		

This shows some degree of improvement in 53% of cases. In Cases 1, 2, 11, and 13 the attacks increased when benzedrine was stopped. In Cases 4, 5, 7, 8, and 9 some improvement was maintained when benzedrine was

stopped. In Cases 9 and 11 benzedrine was given alone: Case 9 was worse, but improved when the treatment was combined with stramonium and hyoscine; Case 11 improved but a better result was obtained when belladonna and stramonium were given as well. Of the cases not improved, one (Case 14) gave a history of head injury and showed a strongly positive Wassermann reaction.

Complications.—In 2 cases of mild hypertension one patient complained of dizziness (Case 3) and one of headache (Case 6). In 2 cases of mitral disease one patient complained of pain in the chest (Case 11) and the other (Case 17) developed a persistent tachycardia which resisted treatment for a considerable time. Only one patient complained of sleeplessness.

Discussion

These results confirm the general impression that in the oculogyric crisis of Parkinsonism benzedrine acts better if combined with drugs such as stramonium or hyoscine. It is interesting to note that 5 patients maintained their improvement even when the drug was stopped and they returned to their original treatment. This, of course, may have been merely coincidence.

In considering the complications which occurred, it would appear necessary to exercise caution in those cases which show signs of hypertension or heart disease, as it will be noted that certain symptoms, including a prolonged tachycardia, occurred in such cases.

The results obtained by American authors are summarized as follows:

Author	Dosage of Benzedrine	Percentage of Cases Improved	No. of Cases Treated
Solomon, Mitchell, and Prinzmetal (1937)	10-20 mg. b.d. or t.d.s. (gave up to 160 mg. p.d.)	100%	8
Finkelman and Shapiro (1937)	20-30 mg. p.d.	100%	7
Matthews (1938)	15-90 mg. p.d.	Improvement reported	?
Davis and Stewart (1938) ..	40-60 mg. p.d.	100%	23

It will be seen that comparison can only be made with those cases described by Finkelman and Shapiro, who gave doses of benzedrine similar to those employed in my own series. I was unable to reproduce their uniformly good results, having had 53% successes as against the 100% which they reported. The remaining three groups of American workers used much larger doses, and I cannot from personal experience say if correspondingly good results would have been obtained had I given similar amounts of benzedrine in my cases.

Conclusions

Benzedrine, even in small doses, may be expected to give relief to about 50% of patients with oculogyric crises if administered with drugs of the belladonna group. Larger doses are worthy of trial if a careful watch is kept on patients with cardiac disease or hypertension.

My thanks are due to the honorary staff of the National Hospital, Queen Square, for allowing me to publish cases which I treated while assistant medical registrar to that hospital, and to Dr. R. G. Gordon of the Royal United Hospital, Bath, for his permission to include Case 17. I also wish to thank Messrs. Menley and James, who kindly supplied the benzedrine used in the investigation.

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Clinical Memoranda

Treatment of Varicose Ulcer with Eczema

To-day the standard treatment of varicose ulcers is by "elastoplast." There are, however, a certain number of cases that are intractable; they appear to be those complicated by eczema. The skin is degenerated, being shiny, purplish, and scaly. Here are four case histories, the first three being consecutive.

CASE REPORTS

Case 1.—A woman aged 45 had "white leg" following pregnancy seventeen years previously. An ulcer appeared two years later, and persisted until June, 1939, when treatment by elastoplast was started. It was 3 in. by 4 in. in area, and was situated about 2 in. above the internal malleolus. After a year the ulcer measured 2 in. by 1 in. Further treatment failed to reduce its size, and another smaller but very painful ulcer, about one-half inch across, appeared. The whole leg was the seat of eczema by now. Treatment by reversed elastoplast was tried without success. In despair a "viscoplast" bandage (a bandage impregnated with Unna's paste) was applied in three thicknesses. It was painful at first, but after a few days the pain ceased. About this time the patient was confined to bed for two weeks on account of laryngeal spasm. A certain amount of discharge occurred; this was absorbed by packing with wool. On removal three weeks later the ulcer had almost disappeared, and a second application resulted in a complete cure. For the last six months she has worn a crêpe bandage. Apart from the two weeks in bed, which was a help, she has done her ordinary work as a farmer's wife.

Case 2.—A woman aged 64 had suffered from a varicose ulcer off and on for twenty-nine years. When she came for treatment it was the size of a shilling. Elastoplast was applied twice in five weeks, and resulted in great improvement, but she refused to have it applied again. Viscoplast was tried, with the result that the ulcer healed soundly—the first occasion since it appeared. She did her work all the time.

Case 3.—A woman aged 67 had a small painful ulcer over the internal malleolus, with degeneration of the surrounding skin. Here "viscoplast" was applied at the outset, causing much pain for the first few days. It was left in position for three weeks, when the ulcer was found to be soundly healed. She was able to do her housework after the first few days.

Case 4.—A man aged 65 had for six years the worst varicose eczema I have seen. An abscess had formed over the patella, possibly the result of septic absorption. "Elastoplast" was applied twice with some benefit, then followed two applications of "viscoplast," each kept on for three weeks. The man, a butcher, is on his feet a great deal, but directly the abscess over the patella had healed he carried on with his work. He now wears a crêpe bandage, and declares he is better than for years. The skin is still purplish, but is not ulcerated or scaly.

London, W.1. A. P. BERTWISTLE, F.R.C.S.Ed.

An award of the Dr. Jessie Macgregor Prize in Medical Science will be made in July to the applicant who presents the best record of original work in the science of medicine. Such work may be published or unpublished, but must not have been published earlier than three years prior to July, 1941. The value of the prize is not less than £50 and is open to medical women who are graduates in medicine of the University of Edinburgh, or who have taken the Scottish triple qualification, and who before becoming qualified, have studied medicine for at least one year in Edinburgh. The successful applicant shall, within six months following the award, deliver a lecture to the medical profession in Edinburgh on the subject of the work for which the prize has been awarded, such lecture to be entitled "The Dr. Jessie Macgregor Lecture." Applications marked "Dr. Jessie Macgregor Prize" must reach the Convener of Trustees, Royal College of Physicians, Edinburgh, 2, not later than June 30.

Reviews

THE DIFFICULT CHILD

The Doctor and the Difficult Child. By William Moodie, M.D., F.R.C.P., D.P.M. (Pp. 214. $1.50, or 8s. 6d. net.) New York: The Commonwealth Fund; London: Oxford University Press. 1940.

Dr. Moodie has written a book on the difficult child which is characterized by his usual lucidity and sound common sense. Published by the Commonwealth Fund of America, which has so generously supported child guidance in this country, this small volume sets out the principles and practice of child psychiatry in simple terms and without any noticeable bias towards any of the extreme schools of modern psychology. The first part deals with general principles. The difficulties presented by children are very varied, and only long experience will ensure that the significance of these is properly evaluated. The child and his parent must be regarded as a unit, although the child is also an individual. He demands, and has the right to, love and security and understanding: and if the parent cannot give these then it may be the parent who requires treatment. Dr. Moodie is one of those who believe that many of the problems of childhood are much less complicated than some would have us believe, and that adjustment of the environment is often the main requisite, with some guidance of parent and/or child on how to meet the situation, but he does not neglect the less common case when there is a profound disturbance of the child's own emotional life which can only be resolved by careful treatment of the child himself.

The second part of the book deals with specific problems such as stealing, lying, sex misdemeanours, truancy, and so on in the emotional field. Psychoses in children and mental deficiency are briefly dealt with, and the very important subject of educational backwardness is more adequately presented. Brief case histories are given to illustrate the various subjects touched upon, and this prevents the brevity of the presentation from resulting in dullness. This is a book which can be confidently recommended to both medical and lay readers: they will learn from it all that needs to be known about the difficult child by those who do not profess to be experts.

ABDOMINAL OPERATIONS

Abdominal Operations. By Rodney Maingot, F.R.C.S. Volumes I and II. (Pp. 1,385; illustrated. £5 the set.) New York and London: D. Appleton-Century Company. 1941.

Except that the covers are green instead of blue, this two-volume book is reminiscent in size, shape, and print of the last edition of Moynihan's classical two-volume contribution to abdominal surgery, published in 1926. Here, however, the resemblance ends, for the present book lacks the clarity of presentation and mastery of diction of the great Leeds surgeon. It is none the less a thoughtful and carefully prepared work, well written, and pleasing in many particulars, one of the chief of which is the illustrations. There are for the most part excellent wash drawings made by Miss Lariviere, and they also include some of Mr. Thornton Shiell's well-known work in the form of coloured plates of pathological specimens. Chapters on sternal puncture and post-operative chest complications are written by Drs. L. T. Bond and R. Sleigh Johnson respectively; otherwise the work is that of a single author, Mr. Rodney Maingot, who, however, freely intersperses throughout the text quotations in small print from important original contributions such as those of Wilkie on acute appendicular obstruction and Ernest Miles on cancer of the rectum. An index of quoted authors is not included, and the subject index is far from complete. Proof-reading might have been better; the legend to Fig. 93 on page 453 is "Stamm's gastrectomy," and should obviously be "Stamm's gastrostomy."

In certain discussions on treatment several operations are described, but no very clear lead is given as to which is the best of these and what the author's experience of the alternatives has been; thus in irreducible intussusception seven methods of treatment are mentioned, with the statement that all are associated with a high mortality, and the surgeon must obviously decide at the operating table which method will give the patient the best chance of recovery. But how is he to decide? If this work is to help the young surgeon confronted with such a problem some further comment is highly desirable, and Elliot-Smith's important paper (*Lancet*, 1935, **1**, 992) on the outstanding value of lateral anastomosis in such cases might have been quoted with profit. We looked in vain for authoritative accounts of errors of rotation of the gut, of portal pyelophlebitis, and of attempts at treatment of this condition by mesenteric venous ligature and the use of sulphonamides Disappointment in some directions, however, is largely compensated by full and interesting accounts of other abdominal lesions, and the account of gastric resection is perhaps one of the best parts of the book. Abdominal incisions and diseases of the vermiform appendix are well done, but we would like to have seen acute appendicular obstruction as a subheading to acute obstructive appendicitis, since it should surely be our object to recognize and treat the obstructive lesion before it becomes an inflammatory condition, as it invariably does if not dealt with very promptly. It is interesting to note that the author expresses strong belief in the occurrence of chronic appendicitis, and regards it as comparatively common. Prof. Grey Turner's important paper in *Chirurgica Scandinavica* (1932) might have been quoted on conservative resection of the rectum with preservation of the anal sphincter. We would also like to have seen the thorny subject of abdominal adhesions and their prevention discussed at some length, and some indication given as to the value of sulphonamide therapy administered by intraperitoneal and oral routes in inflammatory lesions. A complete chapter on anaesthesia for abdominal operations would be a useful contribution to a further edition.

Volume I deals with abdominal incisions, stomach and duodenum, spleen, pancreas, and the gall-bladder and bile ducts; Volume II with the liver, vermiform appendix, peritoneum, mesentery and omentum, external abdominal hernia, the intestines, and post-operative chest complications. There is, notwithstanding the points we have raised, much valuable material in this book, which should make its appeal to the thoughtful abdominal surgeon.

LOCAL GOVERNMENT ADMINISTRATION

The Municipal Year Book and Encyclopaedia of Local Government Administration, 1941. Edited by James Forbes. With a preface by the Right Hon. Malcolm MacDonald, M.P., late Minister of Health. (Pp. 1,443. 40s. net.) London: The Municipal Journal, Limited. 1941.

There is something very buxom and comforting about the appearance of the *Municipal Year Book* for 1941. It is as ample as ever—weighs four and a half pounds and has fourteen hundred pages packed with information about the various aspects of local government. It is all so normal, so traditionally English. One feels that whatever may change in British society, municipal institutions will remain. The town clerk is six hundred years old and is

good for six hundred years more. But with the coming of totalitarian war local government has moved into place as one of the great fighting Services. Every town hall is a sort of military headquarters. The tasks of corporations and even of village councils have grown out of all recognition, not merely in extent but in shape. Civil defence services, the administration of air-raid shelters, hospital provision, casualty services, the evacuation of children, the reception of refugees, food control, the war-time lighting of streets, removal of debris and salvage of material, extension of police, fire, and other protective services to meet the conditions of emergency—all these have imposed immense tasks upon local government officials. In addition the normal activities have had to be continued in changed and strained circumstances—health services, education, public cleansing, housing and slum clearance, libraries, open spaces, supervision of fairs and markets, foods and drugs, electricity and gas supply, smoke abatement, welfare of the blind. During the past year there were thirteen new Acts of Parliament affecting local government, and, what are more onerous, two hundred statutory rules and orders, relating to aliens, to civil defence, to highways and road traffic, to fire brigades, and a host of other subjects.

The way in which local government officials have risen to the occasion has won general public recognition, and the late Minister of Health, in a preface to the present volume, adds his meed of praise. The *Year Book*, which with less capable editing might have been chaotic, is well arranged in nearly fifty sections, not overladen with statistics, and at the end there is a directory giving the fullest details—population, rateable value, names of councillors and officers, and every conceivably useful piece of information—relating to the sixty counties, the four hundred boroughs, the thousand urban and rural districts in England and Wales alone, not to speak of Scotland, Northern Ireland, and Eire. This great local civil service has a chronicle worthy of its pride.

SCENES OF MEDICAL LIFE

Fingal's Box. By Harley Williams. (Pp. 382. 8s. 6d. net.) London: Jonathan Cape. 1941.

Scenes of medical life appear to have an attraction for the average reader of novels provided they unveil sufficiently the mysteries of the operating theatre and the laboratory. The medical man usually finds them pitched in too melodramatic a key, and is often exasperated by gross inaccuracies in novels by laymen. Dr. Harley Williams in *Fingal's Box* naturally avoids both these pitfalls, though we were a little surprised that his distinguished researcher stained his sections *after* they had been embedded in paraffin, and rather incredulous of the senior surgeon to a London hospital who obtained his experience in the South African War yet still thought that any surgeon should be able to carry all the instruments he required in his pocket! We also shared the polite scepticism of the hero's colleagues when he announced his cure of cancer by thyroid and pituitary extracts. But these are trifles, and the main theme of the conflicting claims of research and practice, the clash between love and duty, is attractively developed. There are vivid sketches of student life, the hooliganism accompanying an Edinburgh Rectorial election, the macabre surroundings of "midwifery on the district," and the ritual of the resident staff quarters. We hope, however, that the picture of the horrible conditions in the local infirmary of a North Midland industrial town is not drawn from life. The author's description of the tense excitement there over the League football matches adds point to the saying that in England a revolution would never be allowed if it interfered with cup ties. The story is well told and its interest actively maintained; many recognizable types of students and doctors walk through its pages, and we are left with the impression that it takes all sorts to make a medical world.

Notes on Books

Clinical Pellagra, by Prof. SEALE HARRIS of Alabama, is a work of collaboration in which ten other people have taken part. Prof. E. V. McCollum, in a brief foreword, describes it as a "philosophic treatment of clinical and experimental data of many kinds, contributed by many able workers who have contributed to the development of our knowledge of the biochemistry of nutrition and of the biologic agencies which act in conjunction with malnutritional states to undermine and pervert physiologic functions of certain types." It is not until Chapters 18 and 19 are reached that the editor-in-chief gives his description of the symptomatology and clinical manifestations of pellagra, and the general presentation lacks sequence. This book, of nearly 500 pages with many illustrations, is published by Henry Kimpton at 35s.

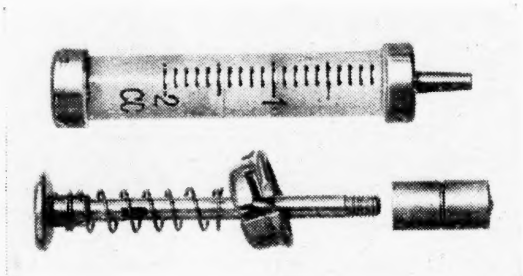
Principal Drugs and their Uses, by A. L. MORTON (tenth edition, Faber and Faber, Ltd., 2s. 6d.), is a pocket volume intended for the use of nurses. All drugs in common employment are listed in alphabetical order and the composition and uses of each are stated in a few lines. Inspection of the volume shows that care has been taken to keep it up to date. The number of editions through which the book has passed proves that it meets a general need.

Preparations and Appliances

SYRINGE WITH PISTON SPRING

Mr. E. LAMING EVANS, F.R.C.S. (London, W.1) writes:

The syringe illustrated, with piston spring, was manufactured by Allen and Hanburys from a pattern made for me by our instrument-maker at the Royal National Orthopaedic Hospital from a small length of a toe-upraising spring and a stock syringe. The spring is easily detachable and can be sterilized with the rest of the syringe. The syringe is assembled by unscrewing the plunger, threading the spring on the piston rod, and rescrewing the plunger.



By depressing the piston rod a negative pressure is exerted in the barrel, and the detection of fluid in vein, cold abscess, pleural cavity, or spinal theca is facilitated. I find it easy to direct the needle by holding the barrel with finger and thumb while the ring finger rests against the flattened end of the piston rod. In some syringes the end of the piston rod where it passes to the screw thread has a shoulder; if so, the diameter of the spring must be sufficient to pass easily over the shoulder on to the piston rod. It is easier to fit the barrel cap on to the piston rod before the plunger is screwed on. The principle of the spring is to make a small negative pressure in the barrel just sufficient to cause fluid to flow into it. The barrel is filled by withdrawing the plunger in the usual way. If the spring is strong enough to fill the barrel as in a dental drainage syringe, control of the piston rod is difficult and the direction of the needle into a small vein hazardous.

I hesitate to think that this simple addition to a syringe has not been suggested before; but if it has been, I have not heard of it.

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INCIDENCE OF CANCER OF THE LARYNX

Maxwell and Hogg[1] in 1933 found from a study of the Registrar-General's returns that in Great Britain between 1911 and 1930 there had been a steady increase in the mortality from cancer of the larynx, so much so that the figure for 1930 was more than double that for 1911. Moreover, the proportion of cancer of the larynx compared with the total incidence of malignant tumours had risen from 1.29 to 1.92%. In this form of cancer the mortality does not represent the true incidence of the disease, because nowadays a large proportion of cases are cured in the sense that, without evidence of its recurrence, the patients succumb years later to some other disease. In cancer of the oesophagus, where Maxwell and Hogg found a fall of from 4.05 to 3.90%, the mortality represents the incidence almost exactly, for cure of the disease in this situation is so uncommon at present as to be almost a medical curiosity. Unquestionably, therefore, the incidence of cancer in the larynx increased even more than the figures of Maxwell and Hogg indicate, even allowing for the inclusion in the figures of some cases of cancer of the epiglottis and sinus pyriformis. Chevalier Jackson and Chevalier L. Jackson[2] have undertaken a similar inquiry into the incidence of laryngeal cancer in the United States. Taking cancer of the larynx to mean cancer of the vocal cords, they have found a similarly increased incidence, both absolute and relative to other cancers. Parallel with this they have found an even higher increase in the incidence of cancer of the lung.

In the United States the statistical investigation presents certain difficulties which do not arise in Great Britain, because in 1900 the Federal surveys of vital statistics included only eleven States. The statistics therefore are available for the whole of the U.S.A. (divided into five geographical sections) only since 1930; and even now Texas is not included. If statistics over a long period are required, then only those from the States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Michigan, Indiana, and the District of Columbia —the registration States of 1900—can be used. In these States the total deaths from cancer per 100,000 increased from 68.3 in 1900 to 120.6 in 1935. Although these figures undoubtedly show an increased incidence, account will have to be taken of such factors as more accurate diagnosis, increased longevity, more careful registration, etc. There is therefore special significance in a table quoted by the Jacksons from the Bureau of the Censor in which deaths from cancer of the larynx are compared with the total deaths from cancer throughout the years 1934 to 1938. Because this period is short and of recent date the errors mentioned are eliminated, and the figures show a steady rise from a total incidence of cancer of 134,528 with 1,100 in the larynx in 1934 (a proportion of 1 : 122) to a total of 149,214 with 1,340 in the larynx in 1938, the proportion changing to 1 : 111. Nearly all writers agree that about 90% of cases of intrinsic laryngeal cancer occur in males, and the figures from America correspond fairly well with this. A curious exception to this 10% incidence in women is mentioned by Tapia,[3] who believes that cigarette smoking is an important factor in the aetiology. In his own 993 cases there were only six female patients, and four of these were smokers. In Spain women seldom smoke, but they do so commonly in Cuba, where Herman Segui observed thirteen cases in women among seventy-five cases, and all the thirteen were heavy smokers.

During recent years the incidence of cancer in another part of the respiratory tract—the lung—has risen even more steeply. Here again a correction is required between the difference of morbidity and mortality, for cancer is often curable in the larynx but seldom in the lung. The true increase in the incidence of these two forms of respiratory cancer must be more nearly parallel than the figures indicate. Cancer of the mouth and the pharynx does not show any increase, the American figures remaining remarkably steady for each year of the period 1934-8.

The cause of this remarkable increase of cancer in the larynx is naturally the subject of inquiry. Some years ago Dr. Chevalier Jackson[4] expressed the opinion that vocal abuse was an important aetiological factor. The Jacksons now say nothing of this, but express the opinion that alcohol and tobacco play an important part. This seems, however, to be only an opinion, and no supporting evidence is submitted. The statistics recorded by Tapia are, however, in agreement with this view, though they can scarcely be taken as scientific proof. The statistics collected by the Kennaways[5] have a more scientific basis. They noted that, according to the census figures for the twelve years from 1921 to 1931 inclusive, out of a male population of 11,916,285 there were 9,472 who died from cancer of the larynx. In the term "cancer of the larynx" they included the extrinsic form on the epiglottis, aryepiglottic folds, fossa pyriformis, and even post-cricoid carcinoma. The incidence in sixty-three occupations was noted, and the number of deaths that should occur if cancer were evenly distributed through all occupations, in proportion to the numbers employed, was compared with the actual deaths. The result was stated as a ratio of 100 registered deaths. Barmen and cellarmen easily head the list. For barmen the calculated deaths were 8.3, the actual number 39, and the ratio 469. For cellarmen the calculated deaths were 4.4, with 14 actual deaths, giving a ratio of 317. At the other end of the list come blast-furnacemen and labourers. The calculated deaths were 7.4, the actual deaths 3, the ratio 40. Gas stokers and coke-oven chargers, however, came high on the list with a ratio of 186. Whether this can be taken as proof that some occupations induce a greater liability to cancer of the larynx seems doubtful. The occupation of supplying beverages containing alcohol does not nowadays necessarily imply an excessive consumption of them, though formerly it undoubtedly did. Although Tapia and the Kennaways may be cited to provide some

[1] *Lancet*, 1933, **1**, 1064.
[2] *Arch. Otolaryng.*, Chicago, 1941, **33**, 145.
[3] *Rev. españ. y Amer. Laryng.*, 1930, **31**, 289.
[4] *Ann. Surg.*, 1925, **77**, 1.
[5] *J. Hyg.*, Camb., 1936, **36**, 236

support for the Jacksons' prejudice against tobacco and alcohol, it is hard to believe that the aetiology is as simple as this. The subject has been studied by StClair Thomson,[6] who weighed and compared all the many possible predisposing causes. He concluded that there was no definite proof in favour of any of them, and this conclusion still holds good. All forms of chronic irritation, including uncommon ones such as keloid scars and the results of poisoning by mustard gas, seem at times to enter the sequence of cause and effect. But statistical research is subject to so many errors requiring an unknown amount of correction that it is difficult through this method to obtain any exact or detailed information.

PLASMA PROTHROMBIN AND VITAMIN K

In a series of annotations we have kept readers informed about the rapid growth of knowledge of plasma prothrombin and vitamin K and their relation to haemorrhage in jaundice and the newly born, and the review by Brinkhous[7] which has lately appeared leaves very little new to say. The emphasis is on the physiology and biochemistry of prothrombin, and its exact role in blood clotting, which is still not clear. Prothrombin can be isolated in a fairly pure state, but the methods of extraction from plasma are very incomplete and cannot be used as a basis for quantitative estimation. Prothrombin is therefore determined indirectly by its power to form thrombin, which initiates the coagulation reaction. Brinkhous prefers the two-phase method of determining prothrombin, which has been used in his laboratory and which corresponds with the actual clotting process. The prothrombin is first converted into thrombin, and the amount of thrombin is then estimated by its ability to coagulate a fibrinogen solution. The clinical pathologist usually estimates prothrombin by the accelerated clotting test (Quick), which depends on the speed of clotting of plasma or blood when an excess of thromboplastin is added: or by Dam's test, which depends on the amount of thromboplastin necessary to produce a standard clotting time. Both these methods work fairly well in practice, but they assume that the prothrombin conversion time is a constant. This is certainly not true of different species, and it is almost certainly not true of members of the same species. For example, there are marked and constant differences in the plasma prothrombin level of infants as obtained by the one-stage and two-stage methods. Dam's test involves more assumptions, and the values obtained seem to be related less intimately to the plasma prothrombin level than in Quick's test or its various modifications. The important point for the clinician to remember is that, whereas a prolonged prothrombin time always spells trouble, a normal prothrombin time does not necessarily mean security from cholaemic bleeding. The clinical pathologist will continue to look for methods of making the tests more accurate and simple. Hobson and Witts[8] have suggested an artificial thromboplastin composed of Russell-viper venom and lecithin, while Souter, Kark, and Taylor[9] use brain emulsion which has been dried by the lyophile technique. This method has leaped into popularity as a result of its use for drying serum and plasma for transfusion, and there seems no reason why some of the troublesome biological reagents for the two-stage prothrombin test should not be similarly prepared.

Brinkhous describes four forms of vitamin K, which are all naphthoquinone derivatives. Vitamin K_1 comes from alfalfa extracts, vitamin K_2 from putrefying fish meal, and thiocol or K_3 from bacteria, while the synthetic vitamin K_4, which is the most potent variant and the one now used in therapeutics, is 2-methyl-1:4-naphthoquinone. Much work still remains to be done in determining the most appropriate form and route of administration in man, the dosage, and the speed of action. Vitamin K_4 is insoluble in water, but it can be given parenterally dissolved in oil[10] or as a compound with sodium bisulphite, which is water-soluble.[11] The parenteral route is probably the best, as it avoids the difficulty of absorption by mouth and the need to give bile in addition. The methods of prophylaxis and treatment of the haemorrhage of the newly born also need more experience before treatment can be standardized, and though the importance of the whole-blood injections may be diminished, it is not yet certain that they can safely be omitted if bleeding occurs.

HORMONES AND PSYCHIATRIC DISTURBANCES

The relation between the endocrine glands and the psychoneuroses and psychoses is being approached from two standpoints—that of the endocrinologist and that of the psychiatrist. The endocrinologist cannot fail to notice the association of psychoneurotic symptoms with primary endocrine disorders or adjustments, and the abolition of such symptoms with appropriate endocrine therapy. This is obvious at the climacteric in the female, and in such endocrine disorders as hyperthyroidism, myxoedema, virilism, Addison's disease, and Fröhlich's syndrome. The existence of a male climacteric is not universally accepted, but where symptoms analogous to those of the female climacteric are found the response to testosterone may be as dramatic as that which follows its use in the complete male castrate. In using the term "psychoneurosis" as associated with endocrine disorders one also includes changes in behaviour and personality. In the experience of the endocrinologist it is comparatively rare for a psychosis to result from an endocrine disease—so rare as to make one suspect, when the two are associated, that there was a previous constitutional predisposition to psychotic disorder. Nevertheless, in such conditions as thyrotoxicosis and myxoedema manic-depressive disorders do occur and sometimes respond to early and adequate correction of the endocrine disorder. Similar observations might be applied to the climacteric, but in view of the millions who pass through the climacteric without the slightest suggestion of psychotic disorder it seems unlikely that the climacteric can be more than a subsidiary factor in the development of a psychosis at this period. From another approach—namely, that of psychiatry—Mott was the first to point to the degeneration of the testis in dementia praecox. With increasing knowledge of endocrinology and the availability of specific sex hormones, the psychiatrist's interest has been quickened, and a spate of articles are beginning to appear in psychiatric journals, some less critical than

[6] *Cancer of the Larynx* by StClair Thomson and L. Colledge, 1930, p. 5, London.
[7] *Medicine*, 1940, **19**, 329.
[8] *Lancet*, 1940, **2**, 247.
[9] *Science*, 1940, **91**, 532.
[10] Macfie, J. M., Bacharach, A. L., and Chance, M. R. A., *British Medical Journal*, 1939, **2**, 1220.
[11] Kark, R., and Souter, A. W., *Lancet*, 1940, **1**, 1149.

others. Some investigators undertake laborious biological assays of the excretion of oestrone, androsterone, gonadotrophin, etc., in the urine, in an endeavour to establish scientifically the existence of an underlying endocrine deficiency or hyperactivity. The fact that oestradiol and testosterone are secreted by the adrenals as well as by the gonads complicates the interpretation of results, but useful data should accumulate. A greater difficulty is that of cause and effect, as it is well known that hormone activity can be completely suppressed by psychic factors (for example, early amenorrhoea in anorexia nervosa), and, further, that degeneration from secondary avitaminosis occurs in endrocrine glands when psychogenic anorexia is present over a long period. Neustadt and Myerson[1] have undertaken urinary assays in various "neuropsychiatric disturbances," using calorimetric methods of assay. In an examination of thirty schizophrenics they find that the values for oestrone and androsterone "range from very low to very high," and the results do not warrant any conclusion. Comparing six patients with involutional melancholia with six normal controls, they find variations in hormone excretion in both groups are of similar order, and "we may tentatively conclude from our findings that hormonal regression, if present, is an accompanying and not a pathogenic factor of the depressive psychosis in the sixth decade of life." They also obtained negative results in hormone therapy of involutional psychoses. In male homosexuals (using a criterion of "overt homosexual conduct as the predominant and preferred sexual activity, with or without physical stigmata") Neustadt and Myerson found that "there is either a deficit of androgens combined with a normal amount or excess of oestrogens, or there is a normal amount of androgens combined with an excess of oestrogens," but "treatment of a few cases by testosterone injections produced no essential change in the homosexual feelings or conduct, although the urinary findings were changed." In psychogenic impotence associated with neurosis and not including psychotic cases, there was low excretion of androgens and oestrogens in eight of twenty cases, but there was no appreciable improvement in symptoms in the only two cases treated with testosterone. This is in accordance with other observers' failure to influence psychogenic impotence with testosterone. A surprising finding is "a very high hormone level of both androgens and oestrogens in five out of six male masturbators." Rubinstein, Shapiro, and Freeman[2] report the treatment of morbid sex craving in five females with 25 mg. of testosterone propionate injected thrice weekly, and claim good results in four. It is true that testosterone will, in certain circumstances, neutralize the biological effects of oestradiol, which latter may experimentally stimulate sex behaviour in the female; but, on the other hand, it has also been found that testosterone produces hypertrophy of the clitoris and heightened erotic sensitivity in that region in some cases. Hemphill and Reiss[3] investigated the state of endocrine function in thirty cases of involutional melancholia occurring at the menopause. They find symptoms of ovarian, thyroid, and adrenal dysfunction in the majority, but emphasize the complexity of the problem. Treatment with follicular hormone and corticotrophic hormone appeared to give promising results in some patients. The authors venture to suggest on clinical grounds, and from assay of gonadotrophic hormone in urine and results of therapy, that "disturbances of the activity of the anterior lobe of the pituitary are largely responsible for the protean characteristics of involutional melancholia." No one would deny that an interesting field of investigation is being opened up, but it is also obvious that great caution is called for in examining the results. It would be a mistake to ask too much of the science of endocrinology when applied to psychiatric problems.

[1] *Amer. J. Psychiat.*, 1940, **97**, 3, p. 524.
[2] Ibid., 1940, **97**, 3, p. 703.
[3] *J. ment. Sci.*, 1940, **86**, 365, p. 1065.

OCULAR PALSY IN PITUITARY ADENOMA

It has been generally held that paralysis of the ocular nerves is not caused by pituitary adenoma, and that the nerves escape because they are protected by the carotid artery from lateral pressure by the tumour. Involvement of the ocular nerves does, however, occur, but the question often arises whether patients with ocular palsy are suffering from suprasellar tumours rather than from pituitary adenoma. Weinberger, Adler, and Grant,[1] in a review of the literature and a study of fourteen cases, conclude that not only are there signs of involvement of the outer wall of the cavernous sinus in a good many cases, but these signs may be the first or predominant feature. Pressure on the outer wall of the cavernous sinus shows itself clinically by pain along the first division of the fifth nerve and by various degrees of involvement of the third, fourth, and sixth. This syndrome, known as the sphenoidal fissure syndrome, was first described in relation to pituitary adenoma by Foix in 1922, though Bartholow discovered it in 1872 in connection with aneurysm of the cavernous sinus. De Lapersonne and Cantonnet used this syndrome as a basis for classifying pituitary adenomata into two groups —those with chiasmal signs, and those showing evidence of pressure on the external wall of the cavernous sinus. That visual symptoms are absent in many cases of pituitary adenoma is, of course, well known; Cushing estimated that they were absent in 20%. German,[2] in a review of fifty cases in Cushing's series of 327 pituitary adenomata, found evidence of nerve involvement (exclusive of unequal pupils) in twenty-four; in ten of these the first indication of pituitary adenoma was given by symptoms of pressure on the ocular division of the fifth nerve. It appears, then, that in a certain proportion of cases the adenoma expands chiefly sideways, resulting in a clinical picture different from that usually thought to be characteristic.

THE PSYCHOLOGY OF QUISLINGISM

Most of us have been surprised by the influence that Hitler has exerted not only over his own people but over individuals in countries not his own—those who have been willing to collaborate with the Nazis even at the expense of their compatriots. The outstanding, and to ordinary eyes despicable, Quisling phenomenon is open to a variety of explanations—"Every man has his price," and "Nothing succeeds like success." There is, too, the stuff of which revolutionaries are sometimes made, such as spite, injured pride, bitter feelings of inferiority, and sensations of frustration and impotence in the face of the prevailing order. No doubt many of Hitler's converts are psychopaths like Hitler himself, but without the energy which makes him look like a genius. They are, in fact, in Henderson's terminology, "aggressive" but not "creative" psychopaths. Although these explanations are satisfactory up to a point, the suspicion that they do not explain everything is shown in the frequent references to the so-called hypnotic powers of Hitler, not only over his own people but over his political visitors. It is recorded of Napoleon that he had a similar effect in engendering fanatical and childlike self-abnegation in some people. Tolstoy,[3] with the intuitive veracity of the first-class novelist, records how an elderly warrior, his face flushed and his eyes gleaming, led his troop through a river, drowning forty of them in the process, for no better reason than that Napoleon was looking on. "Quos Deus vult perdere, prius dementat." There

[1] *Arch. Ophthal.*, Chicago, 1940, **24**, 1197.
[2] Ibid., 1940, **24**, 1235.
[3] Tolstoy, *War and Peace*, Book 9, Chap. 2.

is no sense in such a performance; it is rather a kind of masochism. Those who to this day collect relics of Napoleon, and in a sense worship his memory, are examples *in vitro* of the same kind of abasement. Devotion of such sort deserves examination for its unconscious roots. Dr. Ernest Jones, in a recent analysis of the psychology of Quislingism,[4] has described the various attitudes of those who approved of Nazism—the passive acceptance of the slum-dweller, who thought it a matter of indifference who governed; the denial of Hitler's aggressiveness by the escapist, who asserted there would be no war; the partial admission of Hitler's aggressiveness by the appeaser, who thought it could be bought off; and the man who thought the aggressiveness quite justifiable and even advisable. Jones ascribes all these attitudes in their various degrees up to the fully developed acquiescence and co-operation of the Quisling to the unconscious attitude toward the father. There is fear of him, and of one's own dangerous impulses towards him. The Quisling way is to identify might with right, and to say that because these dangerous impulses are strong they must also be good. At the same time they are denied within the subject himself and projected on to the father, who thereby becomes good as well as powerful and with whom the potential Quisling identifies himself. The attitude is psychologically homosexual. However hypothetical these speculations may be, they emphasize what is clearly important—namely, the part played by guilty feelings in inhibiting resistance to Hitler. German propaganda has in this respect taken a leaf out of the book of some religions. It has known too well how to play on the existence of a sense of sin in the people of Western civilization—a sense which Freudians believe to be based on the forgotten unconscious conflicts of infancy and childhood.

HOSPITAL WORK AN "ESSENTIAL SERVICE"

The reservation of occupations, generally with some age limit attached, and the scheduling of essential services must, of necessity, be a rough-and-ready matter, and a changeable one, too, as the war develops. But now that men of older ages are being called up many faults in the reservation schedule become evident. No doubt when the Essential Services (General Purposes) Order was framed there was a disposition to say that so far as hospitals were concerned it was sufficient that doctors and nurses were in reserved occupations, but that was to leave out of account the many other employees—engineers and electricians, mechanics and stokers, ward-maids and lift attendants—who are essential to the running of a hospital. An immense variety of skilled work, the result either of technical instruction or of long experience, goes into hospital management. The treasurer of St. Bartholomew's has drawn attention in the *Times* to the case of a hospital with 600 beds where a depleted staff of two stokers are working seven days a week to keep the steam and hot-water supplies going, without which the treatment of patients would be impossible, and one of these men is shortly to be called up and there is no one to take his place. The age of exemption of hospital secretaries and other whole-time paid officers has lately been raised, and the fears expressed in many quarters that hospitals might thus be left without adequate staff to administer them are only partially allayed by the latest Ministry of Health circular (No. 2390) on the subject. The Ministry states that all hospitals, if they have not already done so, should take steps immediately to obtain and train substitutes for any staff who are likely to be called up. Application may be made for deferment for a short period of any officer for whose replacement adequate arrangements have not been made, but before recommending deferment the Ministry will have to be satisfied that the duties cannot be performed by a woman or an older man of suitable attainments, or that efforts to obtain such a person have failed. As regards engineers, mechanics, stokers, etc., the circular points out that the age of reservation for such workers is lower in "protected" establishments than in "non-protected" ones, and the Ministry of Labour is prepared to consider applications for admission to the Register of Protected Establishments from hospitals employing at least one whole-time worker in any of these occupations with "dual age of reservation." So far so good, but in many instances it will not be so simple a matter, as the circular would appear to suggest, to train in a "short period" substitutes for the highly technical work of which a hospital secretary is in charge. Moreover, hospitals still remain unprotected against the competition of more highly paid employment. It is extraordinary that hospitals are not scheduled as an essential service, and safeguarded as much as an ambulance right of employees to leave their work. Hospitals are to-day in the front line: those in the cities are casualty clearing stations. They should be recognized as an essential service, and safeguarded as much as an ambulance service in the battle zone.

[4] *Internat. J. Psycho-anal.*, 1941, **22**, 1.

THE PHOENIX NUMBER

The letter of congratulation from a brother editor printed in our correspondence columns this week gives an opportunity to thank many readers and contributors for their kind messages and to say a few words by way of explanation. The "Notice to Readers" on page 755 of the *Journal* of May 17 was necessarily ambiguous, because one of the two events briefly chronicled was very recent and time has to elapse before explicit mention of such things may be made in public. The damage to B.M.A. House occurred during a heavy air raid on London in April. The dislocation of our printing arrangements by enemy action was some three weeks later. Nobody was hurt in these "incidents," but much valuable property was destroyed or severely damaged, and the second misfortune threatened to interrupt publication of the *Journal*. Prompt and effective action restored the printing front and established new lines of communication; so that the issue dated May 17, 1941, appeared without any delay, after being reset at great speed in a different type-face and passed for press under conditions imposing heavy strain upon all members of the Editorial, Advertisement, and Publishing Departments, and not least upon the indefatigable printers and proof-readers. Members of the Association who opened their *Journal* that week-end at the usual time may now be told that something not far short of a miracle had happened in the preceding four days, and that their thanks for this have to be spread over a large number of people who worked together for a common purpose. Fortunately, not many MSS. have been lost, and proofs of all matter standing in type were in safe keeping elsewhere when the enemy struck. Authors of articles or letters known to be missing have already supplied duplicate copies at our request.

The Royal Swedish Academy of Science has elected Sir Thomas Lewis, M.D., F.R.S., a Foreign Member in the Faculty of Medical Research.

Prof. J. A. Ryle, M.D., F.R.C.P., has been appointed Consultant Adviser in Medicine to the Minister of Health for the Emergency Hospital and Medical Services.

CHEST SURGERY IN WAR

This is one of a short series of articles based on lectures given at the British Postgraduate Medical School, Hammersmith

ANATOMY, PHYSIOLOGY, AND PATHOLOGY OF WOUNDS OF THE CHEST

BY

T. HOLMES SELLORS, D.M., M.Ch., F.R.C.S.

In injury to the chest, as also in the case of the head, it is not so much the damage to the container as the damage to the contents that matters. Actual damage to the enclosed viscera may have a profoundly adverse effect on the respiratory and circulatory systems, and to this may be added a series of secondary changes that result from the opening of the pleural cavity. These factors in themselves may be a grave menace to life, but even if they are successfully countered the question of the later development of infection has to be considered. Consequently a chest wound offers problems that are not found in many other parts of the body where the extent and effect of the destruction can be more or less estimated immediately.

Before entering into any discussion of anatomy and physiology it is well to have one precept in mind, and that is that the course and the effect of any missile after contact with the body are almost unpredictable. A well-known surgeon once stated that he was quite prepared to believe anyone's story about the behaviour of any missile on any human frame, and could add a few himself. The varying resistance of tissues, the angles of impact, and a whole host of factors make it imperative that no one should take the apparent track of a wound for granted when it comes to the question of diagnosis and treatment. Nor should it be forgotten that multiple injuries are only too common and that a small and apparently trivial wound may disastrously be overlooked in face of a more urgent and obvious lesion elsewhere.

Some Relevant Anatomical Points

In considering the gross anatomy of the chest there are some quite elementary points that are not perhaps always fully appreciated. The first point that strikes one when looking at the thoracic cage stripped of its coverings is its tapering or cone-shaped upper part. The squared appearance of the human torso depends on the shoulder girdle with its attached structures: in the region of the shoulders the actual thorax is deeply placed and is well covered by muscle layers, in contrast to the lower part, where ribs are easily palpable and the form of the thorax is quite apparent. The practical application of this feature lies in the fact that a missile traversing the upper part of the chest will pass through thick muscle layers which tend to close on the track and prevent communication of the pleural sac with the open air. On the other hand, penetration through the lower part of the chest is apt to leave the pleural cavity open and produce the dangerous form of "sucking" wound.

Among other points that may be emphasized is the height to which the diaphragm rises into the chest. This "doming" upwards of the muscle infringes considerably on the long axis of the thorax and leaves at the periphery the deep costo-phrenic sinus, which, it should be noted, is deeper behind than before. A penetrating wound of the lower chest will frequently puncture the diaphragm after injuring the lung fringe and produce varying lesions of the upper abdominal contents. The blood supply of the diaphragm is more extensive than might be supposed for such a thin sheet of muscle, and this should be remembered if incision through its fibres is practised.

A cross-section of the chest shows that the vertebral column projects far forward into the cavity, so that the distance between the sternum and the spine is relatively small (a matter of some 4 to 4½ inches), but on each side lies a large paravertebral gutter which accommodates much of the lung tissue. It is in these areas that fluid tends to accumulate in the pleural cavities, and that aspiration or drainage of the free pleural sac will be most effective.

The obliquity of the ribs is a feature that makes orientation and location in the chest much more difficult than if the thorax was a conveniently arranged system of transverse segments. A study of the normal antero-posterior radiograph illustrates the differences in level between the anterior ends of the ribs and their corresponding vertebrae. For example, the third costal cartilage lies in the same plane as the seventh thoracic vertebra, though clearly there will be individual variations according to whether the subject has a long flat chest or one of the barrel emphysematous type.

At this point it is not out of place to stress the importance of radiography, and indeed the absolute necessity for *x*-ray films in two planes, for the location of foreign bodies and other abnormalities. The ordinary antero-posterior view may reveal a foreign body lying close to the heart, but it requires a lateral film to show whether the abnormal shadow lies outside the chest or within it.

The anatomy of the ribs and intercostal spaces is important in view of the relationship of the associated vessels. The intercostal space is for all practical purposes a clear and safe area as regards the risk of haemorrhage—a feature that is taken advantage of in aspiration of the chest or when a trocar and cannula are inserted into the pleural cavity. The segmental vessels and nerve are under cover of the lower border of the corresponding rib, and will be injured only if the bone is broken. If it is uncertain whether active intrathoracic haemorrhage is coming from lung and/or chest wall the fact that ribs are intact exonerates the intercostal vessels, but if they are fractured arterial bleeding is a possibility.

Effects of Various Types of Missile

As has already been stated, the effect of a penetrating wound of the chest is variable, but there are certain general tendencies which may be described briefly. A *bullet* produces a small-punctured entry wound, and by virtue of its high velocity drills a clean hole with a minimum of surrounding tissue damage. If it passes through an intercostal space on both sides of the chest it does not make an unduly large exit wound. If, however, a rib is touched an explosive effect is produced and bone is shattered and driven onwards. This impact reduces the velocity and may turn the bullet sideways or even reverse it. The wound track is consequently more extensive and the damage to soft tissues correspondingly increased.

Fragments of bomb are jagged and acquire a tremendous spin, though their velocity is lower than that of a bullet. The effect on the tissues is extreme laceration even though the entry wound may in some instances be small. Pieces of cloth, dirt, and so on are apt to be carried in with the metal and are potential sources of infection, particularly as torn

tissue and blood constitute a fertile soil for bacterial propagation. As against this last statement I must admit that most of the fragments that I have removed from air-raid victims have proved sterile on culture. The lower velocity of this type of missile accounts for so many fragments being retained, and it is interesting to note how often their track ends subcutaneously. Presumably the elastic skin yields at what would otherwise have been the site of exit and does not break. I have seen the same effect inside the chest on several occasions when a fragment has punched a hole in the far side of the chest wall and recoiled within the meshes of the lung tissue, from which it was removed.

Crush injuries may be held to cover damage from falling masses of masonry, direct compression, and the like, and are often responsible for gross and fatal visceral damage without any penetrating wound. Ribs are commonly fractured, several adjacent ones giving way close to the posterior angle. If the bone also breaks anteriorly a whole section of chest wall becomes functionally loose and may be driven in—"stove-in chest"—and may act paradoxically on respiration. Within the chest, lung may be avulsed from its root, and rupture of the heart and great vessels be found.

The effects of "*blast*" have attained some prominence recently, but a full description and an explanation of the findings have not yet been achieved. It would appear, however, that numerous small haemorrhages and effusions occur throughout the alveolar and interstitial lung tissue. Free blood in the air tubes accounts for haemoptysis and also for patches of atelectasis. The distribution of the lesions is erratic, but it is probable that the peripheral areas are most affected, as might be expected when the direct violence of the explosive wave is inflicted on the chest wall. Sometimes it is in the lung fringes that the lesion is well demonstrated, and this may be explained by nipping of the soft tissue between the lower ribs and the diaphragm, which is driven up by the impact on the abdominal wall.

Physiological Considerations

The essential point of the normal physio-mechanics of the chest lies in the fact that two elastic lungs are pulling like evenly balanced springs on each side of the mediastinum. The lungs in turn are held out against the chest wall in a state of tension by the subatmospheric or "negative" pressure in the pleural sacs. If one pleural cavity is violated the underlying lung is released and recoils towards its point of fixation at the hilum. From this point a number of changes in the function of respiration take place.

With the formation of a pneumothorax the balance of the lung pull on the mediastinum is upset and the heart becomes drawn towards the unaffected side, whose tractive force is undisturbed. Inspiration, with general expansion of the chest wall, increases the tension of the sound lung and draws the mediastinum even more towards itself. The result is that with each act of respiration the mediastinum swings to-and-fro or "flutters." The effect of inspiration is to draw air into the unaffected lung, but as it does so it rushes past the bifurcation of the trachea and abstracts some gases out of the collapsed lung. It also means that this lung becomes reduced in size. With expiration the reverse effect occurs and some gases are forced into the collapsed lung, which thus moves paradoxically on respiration.

The movement of gases from lung to lung—the "Pendelluft" of Brauer—results in a steady increase in the CO_2 content and diminution of oxygen, with consequent inefficient and imperfect ventilation of the sound side. The sum of all these factors, if they occur to any marked extent, means that there is actual loss of ventilating surface by collapse of one lung, imperfect exchange of gases, and stimulation of the respiratory centre, besides the effects produced on the circulation by the to-and-fro movement of the heart and great vessels and interference with the venous return.

Puncture of the chest wall or lung may lead to an open pneumothorax, but if the opening is not valvular little harm will result. But, unfortunately, in traumatic surgery it often happens that a ragged external wound through the parietes constitutes a valve and admits more air than can be expelled. Air bubbling and frothing through blood at the skin wound indicates the "sucking" wound that is potentially so dangerous to the respiratory economy. Within the free pleural sac air accumulates steadily—a feature that is made worse by bouts of coughing, which are an almost inevitable concomitant of thoracic injury—and a state of intrathoracic pressure or tension is produced. *Tension pneumothorax* or pressure caused by a haemothorax is a common occurrence in thoracic surgery: the mediastinum is pushed over and encroaches on the ventilation capacity of the opposite lung.

For recognition of this phenomenon there is a physical sign that is often overlooked—namely, the position of the trachea in the neck. The tube is easily palpable in the suprasternal notch, and any deviation is readily apparent. The sign is valuable, since the apex beat and cardiac dullness are sometimes obscured by pleural fluid and are difficult to assess in a patient covered with dressings and bandages. The early recognition of a tension pneumothorax is of the utmost importance, since its neglect may lead to death from direct mechanical embarrassment, whereas its rapid relief could be obtained by putting a needle into the pleural cavity and letting the air escape.

It should also be remembered how tension phenomena can give rise to misleading signs and symptoms. The patient is cyanosed and distressed, and has a persistent cough. Where fluid is present the chest is dull, and on auscultation distant but definite bronchial breath sounds and rales are heard. The diagnosis of pneumonia may be made, but the audible breath sounds are conducted through fluid from a lung completely collapsed on to its root and the rales are transmitted from the opposite side, where the ineffective cough has been unable to expel mucus and secretions. There is no zone of partially collapsed lung to act as a damper between the air current in the bronchi and the chest wall to which the stethoscope is applied. To make an error in diagnosis as described may seem unnecessary, but in a very distressed and mutilated patient it is not always easy to practise the thorough and complete examination which would lead to the recognition of the true state of affairs. One can only emphasize the importance of remembering the possibility of "tension" occurring and deciding whether or not the trachea is in the midline.

Subcutaneous Emphysema

This is a common accompaniment of thoracic injury. The air usually comes from torn lung and is expelled through a breach in the chest wall, but does not escape adequately through an external skin wound even if one is present. The axilla and clavicular fossae demonstrate the typical crackling sensation, and in a severe case the whole head and neck may blow up, making the patient unrecognizable and the eyelids so swollen that he is unable to see. The condition is always more alarming than dangerous, and when it occurs in a crush injury without a surface wound it suggests damage to lung by broken rib fragments.

Haemothorax

The possible origins of blood in the pleural cavity are threefold: the intercostal or internal mammary vessels may be torn, pulmonary vessels may be ruptured, or the heart and great vessels may have been damaged. Clinically it is important to decide whether the bleeding is active or whether it has undergone spontaneous arrest. Section of an intercostal artery is likely to lead to uncontrolled haemorrhage and may therefore require urgent attention; but pulmonary haemorrhage, unless rapidly fatal, tends to check itself. The reason for this latter lies in a balance between two groups of opposing factors. On the one hand, vessels in the lung have a wide lumen and the capacity of the pleural sac to receive blood is considerable; but as against these features there are the potent influences of the relatively low pressure in the pulmonary circulation and the tendency of the lung to retract and so reduce the actual size of the wound in itself. To put it in another way, blood and air in the pleural sac form a pad which acts against the bleeding area. A haemothorax of several pints capacity is not incompatible with life, though prompt blood transfusions have certainly saved many lives.

Blood in a haemothorax has one most unusual character in that it tends to remain fluid in a large number of cases. Infection and tissue laceration may produce massive clotting, but in many instances the effusion shows little if any clot and can be aspirated efficiently through a needle. I have on a number of occasions estimated the haemoglobin and fibrinogen content of both the circulating and the free pleural blood within a few hours of injury. The haemothorax fluid shows on an average a reduction of 35 to 50% haemoglobin and an almost complete absence of fibrinogen. The inference is that the movements of the heart and lungs have whipped up and defibrinated the blood as it wells into the pleural cavity. To account for the reduced haemoglobin figure it is suggested that the blood is diluted by a serous effusion poured out from the pleural endothelium in response to the irritation by blood. The amount of clot, if any should be present, is so small that it seems improbable that a concentration of red cells in it would account for the low haemoglobin figure.

Massive Collapse

Massive collapse or pulmonary atelectasis is a feature that is quite often encountered, particularly with a crush type of injury. At first sight it may seem difficult to understand how an injury to one side of the chest can cause collapse on the opposite side, but the present conception of atelectasis as being basically caused by obstruction to a bronchus makes the explanation fairly straightforward. Blood or mucus in the bronchial tree may not be removed effectively when the expulsive cough reflex is reduced by shock or pain. The foreign matter obstructs an air tube and as a result of this the gases distal to the block are rapidly absorbed into the blood stream. The alveoli become emptied and their walls fall together so that the affected area of lung is represented by a wedge of bronchi, vessels, and airless connective tissue. This elastic mass now affects the surrounding structures and draws them toward itself. The mediastinum is pulled over, the diaphragm elevated, and the chest wall retracted, and the adjacent lung develops compensatory emphysema. If the atelectatic area fails to re-expand, as it does in some cases, the pull of the elastic fibres is finally directed on the only structures which are left for it to affect—the enclosed bronchial elements. In the early stages the cartilaginous bronchial walls tend to resist the external traction, but the continued centrifugal pull finally results in their stretching and becoming dilated. In short, in any case of persistent collapse bronchiectasis will inevitably follow, and it is a question of later secondary infection which determines whether or not the classical signs of infective bronchiectasis will develop.

Pathological Changes

The pathological changes in traumatized lung are very much what would be expected, laceration and haematoma formation being the principal features. The extensive blood supply of the lung accounts for the fact that many badly torn fragments remain viable though their liability to later infection is considerable. A haematoma of the lung presents as a tense firm swelling of rubber-like consistence and of a purple or violet colour, with the visceral pleura stretched almost to breaking-point over its surface. Extravasation into alveoli produces a condition of consolidation which is demonstrated clinically by stained sputum, which later becomes purulent as the condition resolves. The detailed effects of infection on the lungs and pleura will not be discussed here, though their role in the subsequent fate of the patient is clearly of the utmost importance.

Distant Reflex Complications of Chest Injuries

These complications are often considerable though some of the effects may be attributed to damage inflicted elsewhere in the body. There are, however, certain features associated with what appears to be chest injury alone, and of these retention of urine is the most common and most easily remedied. Acute dilatation of the stomach is apt to be overlooked in its early stages and, if untreated, may cause considerable and serious trouble. Among these abdominal complications may also be mentioned "blast," in which multiple and diffuse haemorrhages in the mesentery and under the bowel peritoneum may result in a fatal peritonitis: I have encountered two such cases accompanying a penetrating wound of the chest.

DANGEROUS DRUGS IN INSTITUTIONS

The Home Office has issued a new Order, to be known as the Dangerous Drugs (Approved Institutions) No. 25 Order (1941), approving certain institutions where persons in charge of laboratories may be in possession of and supply drugs and/or preparations to which the Dangerous Drugs Act, 1920, applies. The institutions named in Schedule A are as follows:

All Universities (including Colleges of Universities) of Great Britain.

The University College, Nottingham.

The University College, Southampton.

The University College of the South West of England, Exeter.

The University College, Glasgow (The Glasgow Royal Technical College).

All Medical Schools recognized by any of the licensing bodies specified in Schedule A of the Medical Act, 1858, as amended by any subsequent Act.

Royal College of Surgeons of England.

The National Institute of Medical Research.

The Royal Veterinary College, London.

The Royal (Dick) Veterinary College, Edinburgh.

The Glasgow Veterinary College.

The School of Pharmacy of the Pharmaceutical Society of Great Britain.

Institute of Chemistry of Great Britain and Ireland.

Approval under the Order will remain in force only so long as the Home Secretary is satisfied that the following conditions are complied with:

The person in charge of the laboratory: (1) shall keep all supplies of the drugs and preparations under lock and key and in his own charge, and shall only issue to persons working in the laboratory such quantities as shall be immediately required in the course of research or instruction; and (2) shall keep records of all amounts of drugs and preparations purchased by him in the forms prescribed in the First Schedule to the Raw Opium Regulations, 1937, and in the Second Schedule to the Dangerous Drugs Regulations, 1937, and shall furnish to the Secretary of State whenever required a copy of these records together with a statement of the amounts of each of the drugs and preparations remaining in his possession.

NATIONAL FLOUR FOR BREAD

M.R.C. SPECIFICATIONS

The following is the text of the Medical Research Council's second memorandum on bread, which sets out the specifications for national flour.

The Accessory Food Factors Committee of the Lister Institute and the Medical Research Council, in a memorandum issued in the summer of 1940, recommended the adoption for bread of a flour of 80 to 85% extraction of the wheat, in the following terms:

> "Flour for the bread of the people should contain the germ of the wheat grain, as much as possible of the aleuron layer, and the finer portions of the bran. Instead of flour consisting of about 70% of the wheat grain, as it does at present, the percentage extracted should be at least 80 to 85%."

Since this recommendation was made the Ministry of Food has decided to make generally available to the public bread baked from flour of 85% extraction. In the original memorandum the nutritional considerations on which the recommendation was based were set out. It now seems desirable to restate them, incorporating the results of further research and defining more exactly the character of the particular 85% extraction flour recommended by the committee.

Special Nutritive Properties of the Flour Selected

The degree of extraction was fixed at 85% in order to secure a flour which should contain: (a) As much as possible of the B vitamins, including riboflavin and nicotinic acid and especially of vitamin B_1 present in the whole wheat. (b) As much protein as possible, including a high proportion of that situated in the outer layers of the grain. This protein is known to possess a higher nutritive value than that contained in white flour. (c) As little bran as possible, so that there should be no risk of loss of nutritive value due to presence of much indigestible material. Wartime diets already contain much vegetable food, with relatively large amounts of roughage; it is undesirable to increase this further.

Production of Flour of 85% Extraction

Flour of 85% extraction can in practice be obtained by two general methods: (i) by rearrangement of the milling machinery to produce a flour containing 85% of the wheat, or (ii) by addition to the white flour (73% extraction), obtained in the ordinary milling processes, of combinations of the other fractions of the wheat.

The consideration which has influenced the final choice of the flour to be adopted has been the need to combine two qualities: first, the best nutritive value; and, secondly, the production of a loaf as little removed as possible in colour, texture, and flavour from that of ordinary white bread. Two flours, prepared respectively by the above methods (i) and (ii), were chosen as possessing equal nutritive value, the first, however, being preferable as fulfilling the second condition most perfectly. Flour (i) was selected as the best for the following reasons:

(a) Of all flours obtained at the same level of extraction by different methods from the same grist, it had the highest vitamin B_1 content, and in this respect closely approached that usually accepted for wholemeal bread.

(b) It had the lowest fibre content compared with other flours extracted at this level from the same grist.

(c) Of all the breads tested, baked from 85% flour, it yielded the one which resembled white bread most closely in flavour and texture.

(d) The colour of the bread was pale brown and was not unattractive.

(e) On technical and on aesthetic grounds the loaf baked from it was considered excellent.

Definitions Proposed for the Selected Flours

Flour (i).—This straight-run flour may be defined as a flour containing 85% by weight of the clean wheat, in which is included (a) the maximum amount of the germ and of the aleuron layer, and (b) the minimum of the pericarp, as shown by its low fibre content.

Flour (ii).—May be defined as (a) containing 85% of the weight of the clean wheat grain, in which is included all the white flour, all the reduction roll tails, mill finish and purifier tails, and sufficient fine bran to bring the amount of the mixture up to 85% of the clean wheat; (b) containing 85% of the clean wheat and excluding 15% consisting of the bran and pollards.

Analyses of samples of flours (i) and (ii) are set out in the table below, with those of white flour of 73% extraction and of wholemeal flour, all four materials being derived from the same grist (water content being 15%).

Flour	Fibre %	Ash %	Protein %	Vitamin B_1 I.U. per gm. (Thiochrome Method)	Calcium mg./100 gm.	Phosphorus mg./100 gm.	
						Total	As Phytic Acid
i (85%)	0.60	0.90	11.4	1.2	27	203	123
ii (85%)	0.85	0.94	11.5	1.15	27	211	128
White (73%) ..	0 to 0.20	0.46	10.6	0.35	15	101	35
Wholemeal (100%)	1.8	1.51	11.9	1.4	36	343	246

Samples of flours (i) and (ii), obtained from the same grist, were found to be similar in content of protein, ash, and vitamin B_1, which in both cases was over 1 I.U. per gramme (thiochrome method). The fibre content of both flours was less than 0.9%, that of flour (i) being lower than that of flour (ii) by about 20%. The lower the fibre content the better is the flour and the more efficient is the milling.

Keeping Properties.—No exact evidence is as yet available regarding the keeping properties of the particular types of flour selected, but from the experience gained of other brown and wholemeal flours there is little doubt that this flour of 85% extraction could be kept in good state under reasonable conditions of storage for four to six weeks or longer.

Recommendation I.—The Accessory Food Factors Committee at its meeting on January 23, 1941, recommended that a flour of 85% extraction, similar to flour (i), should be adopted. Since modification of ordinary milling machinery would be required for production of flour (i), and this would take time, it was further recommended that a flour of 85% extraction, similar to flour (ii), should be adopted in the meantime, as this could be produced without any delay. The flour should not contain less than 1 I.U. of vitamin B_1 per gramme, and the fibre should be less than 0.9% (assuming a water content of 15%).

Addition of Salts to Flour

Calcium Salts.—It is known that the intake of calcium salts in the diets of this country, especially among the poorer classes, is often below the minimum accepted by nutrition experts as necessary for satisfactory growth of bones and teeth in growing children and for maintenance of the bones in adults. The addition of calcium salts to bread was recommended in the previous memorandum issued by the Medical Research Council. It is now possible to add details concerning the amounts required. Wholemeal bread and bread made from flour of 85% extraction contain more calcium than white bread and also more phosphorus. A large proportion of the phosphorus, however, is present in a combination (phytic acid) in which it is not directly available to the organism and at the same time diminishes the availability of the calcium present in the bread and in the rest of the diet. Recent tests made on human subjects for the Medical Research Council have shown that to maintain a sufficient supply of calcium salts for health more calcium salts must be added to the diet. The most convenient way to do this is to add calcium carbonate to the wheat flour used for bread. As a result of the above test on human subjects it has been calculated that additions are needed of 65 mg. of calcium per 100 grammes of white flour (7 oz. of $CaCO_3$ as creta praeparata B.P. per 280 lb. sack) and of 130 mg. of calcium per 100 grammes of flour of 85% extraction (14 oz. of $CaCO_3$ per sack). In the case of the 85% extraction flour the extra 7 oz. per sack is required to neutralize the effect of the extra phytic acid contained in flour of this degree of extraction. It has long been a practice in baking to add similar amounts of substances known as "improvers" (e.g., acid calcium phosphate 12 oz. per sack, or up to 4½ lb. per sack in case of certain self-raising flours at present on the market). The addition of the recommended amounts of calcium carbonate to flour has no effect on the vitamin B_1 content of the flour or on its baking properties.

Recommendation II.—It is recommended that calcium carbonate (as creta praeparata B.P.) should be added to the wheat flour from which white bread is made in the proportions of 7 oz. per sack (280 lb.) of white flour and of 14 oz. per sack of 85% extraction flour.

Iron Salts.—The desirability of adding iron in some form to flour has been considered, the reason being that anaemia due to insufficient iron in the diet is common in this country and could easily and cheaply be prevented by the administration of simple ferrous salts. A study of the available data on this subject has, however, led to the conclusion that the presence of added iron salts in flour might cause destruction of some of the other nutrients present. It is therefore not recommended that any such additions be made until further knowledge on this point is available.

"Improvers."—The addition of certain "improvers" to bread baked from flour of high extraction facilitates the work of the baker and results in a more attractive loaf. Such evidence as is available does not justify at this stage the prohibition of their use in the baking industry, and the question has therefore been left open.

THE FUTURE OF PHARMACOLOGY

DIXON MEMORIAL LECTURE

The third W. E. Dixon Memorial Lecture was delivered before the Section of Therapeutics and Pharmacology of the Royal Society of Medicine on May 13 by Prof. J. A. GUNN, who took as his subject "The Future of Pharmacology." Sir William Willcox presided.

Prof. Gunn began with a reference to W. E. Dixon, whose researches, he said, were characterized by a wide range rather than deep exploration in a limited field. Dixon was interested in the scope and function of pharmacology, its place in the medical curriculum, and the facilities afforded to it. In one of his last public lectures, in Capetown in 1929, he expressed dissatisfaction with the position of pharmacology, and claimed that it should be a separate discipline in both research and teaching in medical schools.

Was pharmacology still, as Dixon believed, the most neglected branch of medicine? Pharmacological research might be said to have begun, in sufficient volume to matter, about 1870, at a time when the medicinal use of the substances in the *materia medica* was based upon tradition and empiricism. It was right that pharmacological inquiry should devote itself to the examination of the credentials of this heritage of drugs. Chairs of pharmacology and laboratories were established. The search for new remedies was exciting and gave pharmacology a new standing. Many new plants had been investigated, but the most significant change had been the far greater volume of research on new artificial compounds. The preliminary qualitative investigation of the pharmacological action of a plant might be made with simple apparatus and without any high degree of skill; but when it came to the modern search for new remedies, which usually entailed the preparation of a large number of compounds, the conditions were different. The synthetic pharmacologist could never guarantee that any of the new compounds would have new pharmacological properties or therapeutic value, and thus, although it seemed an obvious solution of the quest for new remedies to secure co-operation between the academic pharmacologist and the academic chemist, in fact this had seldom materialized. It might be suggested that the pharmacological laboratory should possess its own chemical annex and synthesize its own compounds, but this would mean duplication of departments, at which universities might look askance. It was not sufficiently realized that the search for new remedies and new synthetic compounds involved chemical synthesis on a large scale. The field must be extensive even if it need not be ploughed deeply. For a university to take up work of this kind was not very practical. The value of the work was apt to be assessed simply by its success in producing a new remedy.

General and Particular Study in Pharmacology

Prof. Gunn next turned to the relations of pharmacology and physiology. Physiology concerned itself with the normal function of living organisms or tissues; pharmacology with the modification of function produced by chemical agents. The methods used in both were the same, and the subjects were so closely allied that it might seem unnecessary or unwise to separate them; but the primary aims were so different that it was well for the two to be regarded as separate disciplines. For convenience and with a certain amount of justification, pharmacological investigation of substances could be divided into two stages: the study of the general pharmacological action indicating which particular organs were acted upon, and the more intensive and qualitative analysis of substances which appeared to show any kind of therapeutic interest. This distinction between general and particular pharmacology was important. There were certain drawbacks to general pharmacology. It meant a wide range of experiment rather than an intensive study of one system. For general pharmacology the pharmacist required a wide training in physiological technique. The primary survey was sometimes despised as superficial, but the superficial analysis was essential, and not necessarily easier than the analysis of what lay beneath. The worker in general pharmacology had to go from one type of experiment to another, relying on his experience and judgment to decide how far it was economical to pursue the experiment in depth. He must have a competent knowledge of physiology, and use methods which, if not the most elaborate, were at least not obsolete. At the end of his labour he might find that the compound which he had investigated showed no kind of physiological interest nor promised any therapeutic value—that is to say, a value superior to that of the known remedies, and as the number of remedies increased it was becoming more difficult to find one which was better than those in use.

On the other hand, research in particular pharmacology offered certain obvious advantages. If a worker confined himself to the action of one particular system of drugs, he required only one set of apparatus and he could limit his reading; as a consequence, pharmacological research workers usually showed a preference for particular research. This resulted in early specialization, which was a mistake. Beginners were apt to be influenced by the glamour of some great physiologist who had pursued investigation in depth, forgetting that he started with a wide range of technique, and only proceeded to deep investigation when he recognized that the conditions were ripe for it. Again, specialized pharmacology soon lost touch with therapeutics.

The Commercial Pharmacological Laboratory

A development which was beginning in Dixon's time but had acquired increasing momentum since was the establishment of commercial pharmacological laboratories. This was a significant development whereby the future of academic laboratories would probably be affected. It began in Germany, but other countries, especially Switzerland, the United States, and Great Britain, followed suit, and now there were in many countries pharmacological laboratories attached to drug factories which for staff, accommodation, equipment, and finance equalled or excelled the resources of the universities. Their primary object was to discover new remedies by the sale of which the manufacturer hoped to recoup himself. Many of the firms, however, engaged in research of a purely scientific kind, and some of these laboratories were doing important work in that direction. When one looked back to Dixon's complaint that practically all the new remedies came from abroad and that British pharmacology was much behind other countries, he thought this was becoming less true so far as commercial laboratories were concerned. There were possible drawbacks to the introduction of drugs from the commercial side, but the therapeutic value of a drug was not in the least influenced by the motives which inspired its discovery. He mentioned the advantages of commercial laboratories—their larger staff of chemists, their ability to get the necessary products from some other branch of the manufacture, their possession of plant which made them able to produce on a larger scale than the laboratories attached to universities. It was significant that most of the newer remedies had come in the first instance from commercial laboratories.

Finally the lecturer turned to the position of pharmacology in the curriculum and the desirability of a special examination in the subject. The scope of pharmacology was sufficiently wide and its outlook sufficiently idealistic for it to be regarded as a separate discipline. Unless this was done and proper arrangements made, it was unlikely that medical students would be adequately instructed in the kinds and uses of drugs.

The first campaign directed wholly against gonorrhoea to be held in a major city in the United States was recently launched by medical and health groups in Rochester, New York. Among the agencies taking part in the campaign are the County Medical Society, the State Department of Health, the Tuberculosis and Health Association, the Rochester Pharmaceutical Association, and the University of Rochester Medical School.

DESTRUCTION AT THE ROYAL COLLEGE OF SURGEONS

Disaster due to enemy action has befallen the priceless collections of the Royal College of Surgeons of England. During a recent raid a heavy bomb fell directly on the Museum of the College in Portugal Street and fire completed the destruction. Although the Lincoln's Inn Fields façade is still erect and seems to have suffered nothing but broken windows, a scene of heartbreaking desolation awaits one in the entrance hall. The famous lecture theatre is a charred ruin, its pilasters just recognizable. The main block of the Library remains, with books still on the shelves. The principal treasures of the Library had been taken away before the end of last year after some damage in an earlier raid, and the same is true of the equipment of the Bernhard Baron research laboratories on the uppermost floor. But the Museum, the greatest treasure of the College, containing possessions such as no national collection could boast, is a heap of rubble amid which the bones of some amphibian or other indestructible curiosity grotesquely project. Many of the specimens had been placed in tunnels below the building, but the fall of the heavy girders of the main structure broke the thick floor and enabled the fire to sweep the basements. Until the work of excavation has proceeded further no exact assessment of the loss can be made, especially as the College records and catalogues, which are always in a state of revision, were also destroyed.

Loss of the Hunterian Collection

Hunter's world famous collection, which formed the basis of the Museum, may be said to have disappeared. The fraction which remains only serves to emphasize the greatness of the loss. Of the collections illustrating human anatomy not more than twenty specimens have been saved. Large numbers of specimens of human osteology, including anthropological material, have perished. Of 5,200 mammalian specimens illustrating comparative osteology, perhaps twenty or thirty survive, but hardly any of the 3,000 avian specimens or the large amount of amphibian, reptilian, and aquatic material have escaped destruction. Rooms IV and V, built in the middle of the last century, and housing physiological specimens and comparative anatomy, were blasted away. A loss most grievous is the anthropoid room. Specimens brought from the other side of the globe by Sir Joseph Banks and Captain Cook have also gone. The fine collection of primitive Tasmanian skulls and of Australian skulls and skeletons, the original Gibraltar fossil cranium, and the mummy room, containing one of the best collections of mummified material in existence, are no more. The great bulk of the teratological collection (monsters and malformations), numbering over 200, the collection of calculi and concretions, over 500, the collection of trephined skulls, the Onodi collection, and the Cheatle collection of temporal bones are destroyed. The collection of invertebrates, numbering over 2,000, is a total loss. The entire Army Medical War Collection of pathological and other specimens has disappeared, with the exception of Henry Tonks's pictures and one or two specimens which had been moved away after the building was previously blasted. The room containing historical instruments no longer exists; a few of the instruments have been salvaged, but after the treatment to which they have been subjected they are not likely to be of much value or interest. The instruments used by Lister himself are still in a case in the hall. The artificial Roman leg, the old stethoscopes, the illustrations of the evolution of instruments have all gone, and so, it is believed, have Jenner's medicine chest and his silver lancet, and certainly Hunter's furniture.

Specimens that have been Saved

Turning to the brighter side of the picture, Rooms I and II, built in 1888, still stand, although roofless, and the human specimens they contain are almost intact. The Negus laryngological collection has been saved, except for one large wax specimen, and the collection of the Odontological Section of the Royal Society of Medicine, containing about 5,000 specimens, of which the College was the custodian, has also been preserved. Of the anthropological material, a good many of the Nubian specimens still exist, along with the Mount Carmel fossil material. Paget's classical skeletons have been preserved, also the specimens illustrating the comparative anatomy of the brain. The histological section, containing some 12,000 specimens around a nucleus of 200 of Hunter's, is still in existence, and the salvage includes Hunter's great auk, the dodo, and the moa, also specimens illustrating Hunter's experiments on growth, which were in the basement under sandbags. One cares less about the survival of some of the College curiosities, such as the skeleton of the consort of Richard Cœur de Lion and others whose authenticity is by no means beyond doubt, and the Sicilian dwarf and the Irish giant have not much scientific interest. The College statue of Hunter, which was a prized possession, had been bricked up, and has been preserved uninjured—at least the brick erection still stands foursquare amid the surrounding ruins.

An appeal will be made in due course to the members of the medical profession to contribute specimens to a new collection, but the treasures of historical interest can never be replaced. The patient acquisition and labour of a couple of centuries are brought to nothing in a night by an act of such purposeless vandalism as makes one aghast even amid the repeated insanities of war. The act seems to negative that upward thrust of evolution which the Museum so magnificently exemplified. Questions may be asked later why the policy of dispersing the exhibits was not adopted, but in the meanwhile we can only extend our sympathy to the President and Council of the College, and not less to the conservators and curators past and present, to whom the collection was a part of their very lives.

Nova et Vetera

SIR D'ARCY POWER'S LIBRARY

Before the sad news of Sir D'Arcy Power's death reached them many people had heard with regret that Messrs. Sotheby were to disperse the large and valuable collection of medical books which one of the most honoured Nestors of the profession amassed with taste and discernment over the greater part of his long lifetime. The sale opens on Monday, June 9, at 11 a.m.

William Harvey is well represented: it is true there is no copy of the most desirable of all his works, the *De Motu Cordis*, in its original edition, but there are two copies of the first edition in English (1653, Francis Leach for Richard Lowndes). The *De Generatione* is here in the 1651 Amsterdam edition, as well as in the first English edition (1653, James Young for Octavian Pulleyn) and in the Hague edition of 1680. There are two copies of R. Banister's *Treatise of One Hundred and Thirteene Diseases of the Eyes* (1622, Felix Kyngston for Thomas Mann); also an earlier (1586) *Briefe Treatise touching the preservation of the eie sight*, by Walter Bayley, Physician to Queen Elizabeth; this is an especially desirable copy, as it is inscribed by the author to his "lovinge frynde mr John Pophame," who was Attorney-General and treasurer of the Middle Temple. John Browne's *Adenochoiradelogia* is subtitled "an Anatomick-Chirurgical Treatise of Glandules and Strumaes," 1684; it is represented by the first edition and also by another of the same year. With the latter is catalogued Beckett's *Free and Impartial Enquiry into the Antiquity and Efficacy of Touching for the Cure of the King's Evil*, 1722. J. Bulwer's *Philocophus*, or *The Deafe and Dumbe Mans Friend*, 1648, is being offered with some others as one lot. Older than these are J. Goeurot's *Regiment of Life*, black letter, 1550; Alexis of Piedmont's *Secretes*, translated by W. Warde, 1568; Francis Arceus's *Most Excellent and Compendious Method of Curing Woundes*, 1588, with a picture of a surgical boot of surprisingly modern appearance. Andrew Borde's *Breviarie of Health* is listed in three editions—1575, 1587, and 1598. William Clowes is represented by his *Briefe and Necessarie Treatise*, 1585, about syphilis and its treatment by inunction; Paulus of Aegineta by his *Opus Divinum* of 1532. There is also a second edition of W. Bullein's *Bulwarke of Defence Against all Sicknesse*, 1579, which is noteworthy as it has a contemporary calf binding. The *Regimen Sanitatis Salerni* and others of that school are present in more than a score of editions and commentaries, the most desirable, perhaps, being

that of 1480, and an Italian MS. in Latin, also of the fifteenth century; Thomas Paynell's translation into English, 1557, is among those offered. T. Gale's *Workes of Chirurgerie*, 1586, and Roesslin's *Byrth of Mankind*, edited by Thomas Raynold, 1552, have their title pages reproduced in the catalogue. T. Vicary's *Englishe-mans Treasure*, 1586, has bound in with it William Turner's *Rare treasor of the English Bathes*, gathered and set forth by William Bremer, black letter. Another very desirable volume is the first edition of Bartholomew Traheron's translation into English of John Vigo's *Most Excellent Workes of Chirurgerye*, 1543, "wyth the Kynges moste gratious privilege for seven yeares" Mention should also be made of the *Orders and Ordinances for the better Government of the Hospitall of Bartholomew the Lesse*, 1580; and of the *Statutes of 32 Henry VIII*, black letter, 1540, containing "an Act concerning the privileges of phisicions, and an act concernyng Barbours and Surgeons to be of one companie." There are other rare medical books in the collection, which contains also many books not of medical interest and will take a day and a half to pass completely through the hands of the auctioneers. *Eheu, fugaces . . .*

Correspondence

Rehabilitation of the Injured

SIR,—The correspondence in your columns following my article on rehabilitation of the injured (April 5) has raised several points to which I feel prompted to reply.

Both Mr. Griffiths and Mr. Butterworth rightly stress the importance of correct psychological approach, and the former raises the question as to whether the methods I described of measuring and recording efficiency in affected muscle groups might not, by focusing the patient's attention on his injured part, induce an introspective state of mind unfavourable to recovery. I have never found any such effect in normally balanced patients—in fact they react in the opposite direction by deriving encouragement and initiative from the evidence of improvement shown in their muscle efficiency charts. In some cases this improvement has been so gradual that the patient would otherwise have been unable to appreciate it from week to week, and these charts have then fulfilled a most useful purpose by preventing those doubts and fears which so often appear in the late stages of serious injury and destroy the patient's will to recover. It is the absence of improvement, either imagined or real, and not the measurement of it, that depresses the patient and causes him to develop psychoneurotic tendencies about his disability. There is another type of case in which the psychoneurosis is a thing apart, quite independent of any physical disability that may or may not exist. These cases are not affected either one way or the other by purely physical methods of treatment and are not suitable for the type of rehabilitation centre I described.

Dame Georgiana Buller raises two very interesting points. She advocates a more comprehensive use of the term "rehabilitation" to include vocational training on the grounds that this is "economic rehabilitation," whereas what we as surgeons are concerned with is physical rehabilitation. There is also a third variety—namely, psychological rehabilitation. It may be desirable to have a general term to cover all three processes, but it is equally desirable to be able to refer to each of them in quite specific terms. Psychological rehabilitation is the province of the psychiatrist; physical rehabilitation is the province of the traumatic surgeon; and vocational training is a matter primarily for workers outside the medical profession.

Dame Georgiana Buller would favour the creation of institutions where all these activities can be carried out under one roof, but I am convinced that this would be a mistaken policy. No seriously injured miner would ever go back to work in a pit if he were presented with any alternative method of earning a living, especially if, as in the example quoted by Dame Georgiana Buller, this also increased his earning power. If his failure to recover held out the prospect of being transferred to another section of the centre where he could be taught to make a living in more pleasant and easy paths, the recovery rate would fall to zero. Very few people become miners from choice, and I imagine the same applies to other industries in which the work is arduous and dangerous and in which there are periodic slumps which affect the workman's security of employment.

The whole success of vocational training depends not simply on learning a new job but on being able to get it afterwards. Otherwise vocational training ceases to be "economic rehabilitation." The best way to ensure that there is always a sufficient number of these jobs to go round is to see to it that there are as few cripples as possible in need of vocational training. This can best be done, as Mr. Watson-Jones so clearly points out, by providing the facilities for complete physical rehabilitation wherever fractures are treated—and the time to do it is now.—I am, etc.,

Mansfield, Notts, May 22. E. A. NICOLL.

Treatment of Peripheral Nerve Injuries

SIR,—In a recent discussion on peripheral nerve injuries at a meeting of the Orthopaedic Section of the Royal Society of Medicine many interesting points were brought up, and among them was the highly satisfactory announcement that in England at least such cases are segregated for treatment in special hospitals. Surely a similar segregation should also be carried out in Scotland. Rowley Bristow said it was necessary for the older surgeons to cast their minds back for some twenty years in order that some elementary mistakes might be avoided. As things are at present much of that experience is not being made use of, as many of the cases are subjected to operation in hospitals which have not the equipment to deal with them. The results are seen in the Ministry of Pensions hospitals. Doubtless few of the hospitals are supplied with a faradic battery or a condenser discharge apparatus suitable for use at operation, and so valuable information is not available at an important stage. The finer muscular movements and sensations are difficult enough to achieve in median and ulnar lesions without adding to these difficulties by delay and doubtful treatment.

In the last war a very thorough training was considered necessary before a young surgeon did any major orthopaedic surgery. At Bangour, the Edinburgh hospital, there was the opportunity of the teaching of Sir Harold Stiles, and many long weary hours were spent assisting a splendid team of American surgeons before the personal conduct of an operation was permitted. It is not suggested that such a training is necessary, but if segregation cannot be achieved in Scotland then it is necessary that in the interests of the patient and therefore of the country some form of supervision should be instituted to ensure a uniformly high standard of work.

I believe, however, that all nerve cases should be admitted to orthopaedic nospitals near their own homes before any treatment is carried out—in fact, as soon as diagnosed. I say *any* treatment, because even bad splintage of a few weeks' duration may irreparably damage joints such as the metacarpophalangeal joints of the hand. Following the period of in-patient treatment an adequate after-care scheme will be necessary in which the cases are followed by those concerned in their hospital treatment with physiotherapeutic measures and occupational therapy where possible.

It was an interesting commentary on the vulnerability of peripheral nerves in air raids as compared with war wounds to hear from one of the surgical directors that there were only 0.7% of nerve injuries over a considerable number of casualties in a recent air raid. If this percentage should prove to be correct, then the evolution of a scheme for segregation of cases should present few difficulties.—I am, etc.,

Edinburgh, May 14. WALTER MERCER.

Stirrup Pump Solution: A Warning

SIR,—It has come to my knowledge that solutions of zinc chloride are being sold to the public for attacking incendiary bombs through the stirrup hand-pump. I am informed that these solutions contain about 70% of zinc chloride. It would seem right to issue a warning concerning the use of such solutions, especially in confined spaces. Zinc chloride in the above strength is a corrosive poison, and if some of it got into the eye it would be extremely painful; it would produce temporary blindness, thus immediately incapacitating the operator of the pump; and even if effectual treatment was applied at once permanent damage would be likely to result. I am further informed that when these solutions are brought into contact with burning magnesium, fumes of hydrochloric acid and zinc chloride are evolved. If such fumes are inhaled there may be serious effects in the respiratory passages.

Finally, if such solutions come into contact with the skin and are not washed off they may cause skin lesions.

I am not in a position to express any opinion as to whether such solutions are greatly superior to water in dealing with incendiaries and the fires caused thereby, but I do express the opinion that unless this be so, the possible dangers involved from their use are such that it would appear to be most undesirable to permit the public to have unrestricted use of them.—I am, etc.,

London, W.2, May 19. G. ROCHE LYNCH.

Coventry Revisited

SIR,—After an interval of five months Coventry was again subjected to heavy air raids in April of this year, and the question might be asked, Did the A.R.P. services do better work because of what was learned during the previous devastating raid?

In the raid of November, 1940, the main difficulty of doing any sort of first-aid treatment arose from the fact that the supply of running water, gas, and electric light to the posts failed, and the substitutes for these essential services were not immediately available. Obviously it was necessary to remedy this. After the experience of the November raid a large tank of water, frequently changed, was kept at the post where I am stationed, and it was hoped that the supply thus kept ready would suffice for any one night. In April of this year, when the wardens' whistles were heard, denoting that incendiaries had fallen (a good signal to get busy), the nurse ordered all hot-water bottles to be filled with very hot water, instruments to be boiled, dressings arranged, beds made up, etc. Our preparations were complete before the first casualty arrived, and shortly afterwards the gas supply failed. Lamps were also lit, so that, if the electric light had failed, there would have been little mental shock to the casualties and no pause in the work of dealing with them.

We had, I think, learned something about the better disposal of casualties within the post. Obviously badly wounded and shocked cases were screened off and placed close to radiators, but a first-aid post is not a hospital, and screens are few. We were, however, fortunate in getting two excellent cases early in the evening—an old man and his daughter. They had been buried by debris. They were filthy dirty, but their only complaint was that they both had lost their false teeth. We put them at the side of the ward, facing the entrance, and gave them tea, and until they went to sleep they welcomed every new casualty with a broad edentulous grin, which seemed to say: "Come and join the party. You'll be all right now."

One thing we have still not learned. We have not learned how to remove clothes quickly and painlessly. It is no easy matter to remove a heavy leather overcoat from a man who complains of, say, a pain in his arm. It seems hardly justifiable, and not easy, to cut to pieces a heavy leather coat, possibly to find that the only injury is a mere contusion.—I am, etc.,

Coventry, May 10. NOËL R. HOLMES.

Obscure Nervous Effects of Air Raids

SIR,—The correspondence that has followed upon my letter (April 12, p. 573) stimulates me to venture on some further remarks on the above subject. For to the best of my belief the explanations offered by Dr. H. Crichton-Miller (April 26, p. 647) and Dr. Clifford Allen (May 10, p. 727) do not by any means cover all the cases that I had in mind. They appear to be of the view that the cases of stupor and extreme distress, which I mentioned in my letter, are predominantly or entirely due to physical effects of air raids. I have a certain amount of reason to question this.

Actual studies in a London district and in a coast town, extending over some three months in each case, have shown that depressed morale is not always directly associated with the amount of bombs. There is a tendency for those who are living immediately around an incident to stay put, wherever houses are habitable, better than those living further away from an incident or incidents. There is a tendency for those who have *nearly* been hit to feel that they have had their turn, whereas those who have only seen or heard of others nearly hit feel all the more insecure and that "it's our turn next." This type of reaction can be measured by studies of evacuation, especially of adults from undamaged houses. We hope in the near future to publish a very detailed study of this sort which we have made, where we have related every bomb to the corresponding households, found out how the households have split up or stayed put, attempted to measure the effects on habits, opinions, and morale of those who have stayed through the numerous bombardments.

All this suggests to me—and this is confirmed by a good deal of other research that we (Mass-Observation) have done in the morale field—that it is often those not so directly or physically affected by air raids who are most upset by them. And there do not seem to be as yet any data to justify generalizations such as those made by Dr. Crichton-Miller. I feel that his letter was rather in line with the general medical attitude that stimulated me in the first place to draw attention to this matter. There seems to be a distinct, perhaps unconscious, tendency to gloss over the serious psychological effects that air raids have on people, and to insist that the neurotic effects are negligible.

I have spent practically the whole of the past eight months with a unit of investigators in all the "blitztowns" except Belfast. Apart altogether from the cases of stupor and lethargy I mentioned in my previous letter, I have seen many cases of distress, shock, mild hysteria, and several instances of personal panic. The great majority of people behave with their normal calm and common sense, of course. But no one who has spent any time objectively studying behaviour in the "blitztowns" and getting right in among the mass of the people could shut their eyes—however hard they try—to the very considerable effect that continuous raiding has on people's nervous system, irrespective altogether of the physical impacts. I suspect that the most upsetting factor is *uncertainty*, the intensive insecurity of living in a "blitztown." First, you never know what night the raid is going to come. Secondly, you never know which 'plane noise or other noise is the noise which may mean your end. Too many generalizations have been made from a purely London experience. London is a different story; it is so huge and anonymous. I know from personal experience that it is ten times more unpleasant to be blitzed in a place the size of Coventry or Bristol, where every bomb is personal and every piece of damage is a disaster to one's own town, instead of this great agglomeration of towns which is called London. In London, moreover, those with nervous tendencies have had an invaluable line of retreat, lacking in practically every other city. They have been able to bury themselves underground in the Tubes. The Tubes have provided a safety valve for those who might otherwise have behaved "badly."

There is one other point. The unplanned evacuation which has marked the blitz situation is in itself largely a nervous reaction and one with serious consequences. But the very fact of evacuation relieves the tensions and anxieties which are felt of people stay put. If bombs fall on or near villages to which people already blitzed in a town have evacuated themselves, or if some other highly disturbing circumstances arise, then these people, who have already fallen back as far as they can along the line of physical retreat, may be forced along a further line of psychological retreat. And I think this explains some of the cases I mentioned in my first letter. As I said then, and repeat again, I am only an amateur on this matter. But I do want to insist that there *may* be a genuine problem here, and that if I am right in saying that there is a problem, then it is one which is being neglected. Unfortunately, there is little sign in the correspondence on the subject that anyone intends to do anything else but go on neglecting it. Perhaps the statements on the perfection of our own morale have lulled the medical profession into complacency on this subject? But I hope not.—I am, etc.,

London, W.11, May 14. TOM HARRISSON.

Gas Masks and CO

SIR,—In the article on the diagnosis and treatment of gas casualties in the issue of May 10, should not the first sentence of the concluding paragraph, which reads at present—"The gas-mask, if properly adjusted and in time, gives full protection to the lungs and eyes against all these gases"—have added to it the words, "except carbon-monoxide"?—I am, etc.,

Oxford, May 14. A. G. SANDERS.

Treatment of Burns

SIR,—I heartily agree with Dr. John Gordon (May 17, p. 763) that first-aid posts should use only innocuous substances such as sod. bic. compresses. As medical officer in charge of a first-aid post in my district I have instructed the sister that all cases, no matter how severe the burn should be treated with sod. bic.

The procedure adopted is to clean the burn as best we can (without an anaesthetic). We prick all blisters and wash away all debris (it is surprising how dirty the burns are that we have to treat at first-aid posts); we use an ordinary eye irrigator for this purpose, and again use a sod. bic. solution. A compress of sod. bic. (two to three layers of ordinary white gauze) is then applied and lightly bandaged. A mild sedative such as sod. phenobarb. 1/2 grain is usually given in first and second degree burns (I find there is usually some degree of shock present). In the worst burns with severe shock I give morphine 1/4 grain. All our cases, no matter how trivial, are referred to hospital for further treatment.

At one time we used only lot. ac. tannic. or "tannafax," but I found that the personnel (all first-aid workers) were not quite experienced in this form of treatment, and the sod. bic. compress is now the only method of treatment adopted.—I am, etc.,

LOUIS SHELDON,
Medical Officer in Charge, First-aid Post.

Willesden, May 16.

Diphtheria Immunization

SIR,—Surely enough evidence has been collected by now to come to the conclusion that the Schick test is for all practical purposes a reliable guide to a person's susceptibility to clinical diphtheria. I think Dr. Tudor Lewis has elucidated this point well in his recent excellent book on *Diphtheria Immunization*. Some public bodies do not seem to have realized this yet. Only quite recently I had a letter from my boy's public school asking me whether I would agree for my boy, aged 17, to be immunized against diphtheria by two inoculations. There was no mention whatsoever of the Schick test. Actually my boy was inoculated against diphtheria at the age of 5, and was Schick-negative four months afterwards. I took the trouble to Schick-test him again now and found that he was negative. It would have been a waste of time and material to have had him inoculated again now.

I have come to the conclusion that it is worth while to perform a primary Schick test on all children over 5 years of age. I always take the precaution of repeating the Schick test in four months' time on all children under 10 years of age who happen to be Schick-negative in the first place. Having had an opportunity of immunizing a large number of children since January last, I have kept to one definite method and hope to publish my results as soon as I have completed a sufficient number. This may help the medical profession to come to one general standard for diphtheria immunization.—I am, etc.,

H. W. SWANN,
Medical Officer for Diphtheria Immunization for
May 19. the Boroughs of Hackney and Islington.

Sarcoidosis

SIR,—Dr. G. E. Lewis has described an interesting new case of uveo-parotitis (April 12, p. 552), but his conclusions call for comment. The case is described as one of Adie's syndrome, which it may well be, but there is no description of myotonic pupil reactions; the patient may, of course, have been an atypical example of the syndrome, or in an atypical phase, but there may be another explanation for the pupil changes and tendon areflexia. Were the pupils fixed as a result of a previous attack of irido-cyclitis? In uveo-parotitis the formation of synechiae is very common and no reference to their presence or absence is made. Other unequivocal evidence of involvement of the *central* nervous system is lacking (the areflexia may have been of peripheral origin) and the claim for "visceralization" is too strong. Dr. Lewis describes the development of uveo-parotitis, with the usual histological changes, and quite rightly states that this syndrome is now generally recognized as part of a much more diffuse disorder, for which the term "sarcoidosis" is as good as any other at present. But to claim that no case of this condition ("sarcoidosis of Boeck") showing neurological signs or symptoms has previously been reported is a little surprising. Before the relationship between uveo-parotitis and Schaumann's disease (Schaumann was the first to show that Boeck's sarcoid of the skin was part of a widespread disorder) was realized, it was well known that facial palsy was one of the common signs of the former and that widespread polyneuritis, of varying degree, was not uncommon. Undoubtedly examples of involvement of the central nervous system have been admittedly rare, but Waldenstrom (*Acta med. Scand.*, 1937, 91, 53) reported a remarkable case in which typical uveo-parotitis was complicated by a gross cerebral and possibly spinal disorder; and there have been others, probably including some of those described as "encephalitis lethargica associated with parotitis."

As our knowledge of the clinical picture of sarcoidosis increases it is becoming evident that practically every tissue in the body may be involved, and there is no reason why the brain and spinal cord should be exceptions. On the other hand, I do not think Dr. Lewis's case is sufficiently strong to form the basis of a claim that sarcoidosis bears any relationship to Adie's syndrome.—I am, etc.,

Leeds, April 26. HUGH G. GARLAND.

Undergraduate Teaching in the Municipal Hospitals

SIR,—Mr. Somerville Hastings in his article on post-war medical education in London (May 3, p. 678) has rightly called attention to the opportunities for undergraduate teaching which exist in the municipal hospitals.

At the time when we were students these hospitals were used, as he states, solely for courses in "fevers" and a few attendances at a mental hospital. I feel sure that there would have been insuperable difficulties against extending the teaching at that time, and that the same situation continued until after the last war. But between 1919 and 1939 municipal hospitals improved out of all recognition both in equipment and in the standard of the personnel, with a resulting advance in the clinical work of the hospitals. Mr. Somerville Hastings dismisses in three lines the undergraduate teaching in municipal hospitals in 1939, and this certainly underestimates the position and the progress which was being made. My own hospital, St. Thomas's, is very fortunate in the municipal hospitals in the vicinity, but other teaching hospitals also were taking similar steps. For some time, perhaps not more than two or three years before the present war, we had been rapidly establishing contact with the municipal hospitals, and we were invariably met more than half-way, both by the staff of the hospitals and by Sir Frederick Menzies and Dr. Daley at County Hall. Members of the personnel of municipal hospitals have been placed on our hospital committees, and teaching facilities in these hospitals and arrangements for further developments were advancing steadily. By no means all the teaching was undertaken by the staff of St. Thomas's Hospital. A clinical round in a municipal hospital taken by the superintendent or a senior medical officer would attract, voluntarily, fifty or sixty students. This was partly a tribute to the teaching powers of the personnel, but it was also due to a realization by the students that they would see a type of clinical material which could not be sufficiently represented in a teaching hospital, a point to which Mr. Somerville Hastings rightly calls attention. But I would not entirely agree with him in comparing this material to the ordinary everyday cases of general practice. Unfortunately a knowledge of such everyday cases can be acquired only in general practice, and the Committee on Education of the B.M.A. failed to find any practical method by which this knowledge could be gained before qualification.

This evolution, which was proceeding throughout London, and no doubt elsewhere, with increasing momentum, was interrupted by the revolutionary episode of war. A large number of medical students were suddenly thrown into municipal hospitals that were scarcely prepared for them and had had little voice in the arrangements. Some temporary dyspepsia and anorexia may have resulted, but close contact has been established, and we may be sure that the advantages will outweigh the disadvantages. Nevertheless, even if nothing were learnt from this upheaval, the evolution which was already in progress before the war would undoubtedly continue. The municipal hospitals and the teaching hospitals both realize the

benefit which would accrue from such liaison, and have been moving together with friendship and good will.

Much more remains to be done, but I am sure that Mr. Somerville Hastings will welcome the information that the movement had already progressed so far.—I am, etc.,

London, W.1, May 15. H. LETHEBY TIDY.

American Doctors for Britain

SIR,—I am much interested in this subject now before the profession from an experience during the last war, when I occupied the position of chairman of the Recruiting Medical Boards for Cumberland at Carlisle, where thousands of men were examined. I have no hesitation in expressing the view that the present arrangements are superior to 1914-18, and if they were effected to the full there should be little need for the emergency call for 1,000 American doctors at this time. But it is not so, for although a large number of available British doctors have already registered in the ordinary course comparatively few have been posted to date.

During the recruiting period of the last war applications for posts on Medical Boards were received from qualified men hailing from several other countries, and a number were accepted, but temperamental variation and habitude barred the way to good co-operation and harmony; acute friction resulted with consequent resignations, with the result that the whole clinical system extant suffered acutely. I would like to be informed why so many English doctors, quite dispensable for service, under the age of 30 have not been called up and are enjoying seclusion in their own practices. I am satisfied that if the committees in authority for absorbing all the available medical man-power were exhaustively conducted, there would be little need for the emergency call to the Western Hemisphere, initiating an anomalous position. During the last war medical man-power was reduced to an absolute minimum, and only a fraction of the medical community was left to carry on medical practices—in fact, a dangerous position was reached. At the present time, however, the general health of the nation is good, and the vital intelligence of the people is such that this should be maintained for the remainder of the war.—I am, etc.,

C. W. GRAHAM, J.P.,
Ex-President of the Border Counties
Silloth, May 13. Branch, B.M.A.

Medical Man-power

SIR,—I should like to make the following observations on the subject of medical man-power.

1. Doctors of military age are being reserved on account of large panel practices.

2. Doctors whose names are being forwarded by Local Medical War Committees are not being called up. This excludes members of the E.M.S., of teaching staffs, medical officers of health, etc., who are automatically referred to the Central Medical War Committee.

3. As chairman, Local Medical War Committee, City Area, and of Holloway No. 5 Medical Board, I am in touch with many men from widely separated areas. I am told the same story in each case. Hundreds of medical men in London are facing bankruptcy because they have nothing to do.

4. Final-year students are replacing doctors.

5. A thousand U.S.A. doctors and 1,400 aliens are ready to relieve pressing need.

6. One must assume that the central body is *au fait* with conditions in London.

7. There is, in fact, a reserve of British medical man-power available in London waiting to be used.—I am, etc.,

Hampstead, May 9. JAMES FETTES.

SIR,—From letters to the *Journal* and from its advertisement columns it is obvious that the country's medical services are in an unsatisfactory state, which urgently calls for improvement. On the one hand, we have doctors in the raided evacuation areas suffering severely from insufficient work; on the other, doctors in reception areas clamouring for assistance rarely forthcoming.

Is the explanation that the former, often elderly men and women with considerable liabilities, feel that they, should they leave their district, have no protection for the nucleus to which the practice of each has been reduced, or is there some other explanation, possibly also financial? One may be willing in the present emergency to take what offers, but these assistants will many of them be doctors of considerable experience, and their services have, or should have, a much greater financial value than those of the peacetime newly qualified assistant.

A State Medical Service may be inevitable, but in that case it is important that nothing should be done now to encourage the development of a too cheap service. I must admit, however, that the salaries offered in many cases are by no means low.

The matter is urgent. Can anyone offer a reasonable, helpful suggestion? The introduction of American doctors may have its merits, but should not be necessary.—I am, etc.,

London, W.8, May 19. HAROLD H. SANGUINETTI.

SIR,—In the *Journal* of May 10 are letters under the headings "Medical Man-power" and "Overburdened Doctors in Reception Areas," but I have so far failed to see any reference to the unfortunate position of medical men in what might be called voluntary evacuation areas such as Brighton. Our patients of substance have long since left for safer areas. Our male and female panel patients are either called up for the Services or are being drafted into factory work or are seeking domestic service in hotels and houses in reception areas. This reduces one's income to a dangerous level. Add to this the fact that one's partner, a man of considerable experience, is called up to the R.A.M.C. as a lieutenant, instead of as a captain, with commensurate pay to his rank and knowledge, and things are far from rosy! Whereas doctors in the reception areas are truly overworked, and presumably are deriving a welcome increase in remuneration whether they desire more work or not.

Before calling on doctors from America surely use should be made of those of us who are not overworked. After all, charity should begin at home. Why cannot the profession sponsor a pool of medical men from distressed areas and money from reception areas, so that we may all live under more favourable circumstances with less monetary worry?—I am, etc.,

Brighton, May 18. F. HUGO STUTTAFORD.

Overburdened Doctors in Reception Areas

SIR,—Dr. Sophia Graham in a letter (May 10, p. 727) writes concerning the difficulty of obtaining help for overburdened doctors in reception areas. Though compulsorily out of the fray myself, I hope it may not be presumption to state that a great difficulty is the natural reluctance of senior men to accept positions usually held by junior men, and the natural reluctance of the general practitioner to invite a senior to accept such a position where the senior's professional skill, or in some cases social prestige, will have but little outlet or appreciation. General practice (without increase in insurance capitation fee) does not admit of payment of large salaries for assistance, but ought salaries, position, or the diversion of specialist services for a time to be a difficulty? The B.M.A. has, by its fund for temporarily distressed doctors, presumably a list of doctors willing to take work without strict regard to their professional earnings and position in the past, and there should be just as much honour in accepting altered professional conditions as in the fighting Services, where there are thousands of brilliant men who have had to forgo their normal careers and sacrifice position and earnings.—I am, etc.,

Tavistock, Devon, May 19. FRANK BRYAN.

Medical Certification

SIR,—As a factory medical officer it has been my experience that the lessons of the last war have not been appreciated by the medical profession. It was then common knowledge to factory managements that medical certification, especially in T.N.T. conditions, was not of a very high standard. The following two experiences of mine might illustrate what is happening to-day.

Certificates were sent in to the factory stating that an employee was suffering from bronchial asthma due to T.N.T. poisoning. When I saw the employee at the factory surgery I considered that she was suffering from pulmonary tuberculosis,

and referred her to the tuberculosis clinic, who confirmed this, and stated that they had found tubercle bacilli in her sputum. From the other angle, I had a certificate from a doctor to say that a patient of his who had been medically rejected was perfectly fit and healthy, although he stated she had a swelling of the thyroid. This woman was suffering from thyrotoxicosis, and I consider such a condition should be under medical care, and anyone suffering from it is certainly not a fit subject for work with T.N.T. This her doctor disputed.

Diagnosis of T.N.T. poisoning by the factory medical officer is not an easy matter. Our employees whom we suspect are suffering from T.N.T. poisoning have a very extensive examination, which includes blood-pressure reading, Webster urine test, blood count, and examination of stained blood films over and above a physical examination.

It is the earnest wish of factory medical officers that full co-operation between the patient's own doctor and the factory should be established, and it is my desire in this letter to be constructive and helpful. If the panel practitioners are in difficulties regarding their patients whom they presume to be suffering from T.N.T. poisoning, we will do our utmost to assist them, if they communicate with us.—I am, etc.,

May 14. J. H. WATSON.

SIR,—I was interested to read Dr. J. B. Wrathall Rowe's letter (May 10, p. 732) in which he expresses his views as a factory medical officer on the question of the acceptability of many certificates of incapacity. Recently this subject gained singular importance when a magistrate refused to accept their validity. That the medical certificate should thus fall below the status of a legal document is a matter for concern.

The task of the practitioner is not an easy one when dealing with these applications. He is unable wholly to disregard statements by patients, and in many cases must grant a certificate while lacking proof of their veracity. For example, a man may come to the evening surgery requesting such a document on the grounds that he was incapacitated that day by diarrhoea. Many patients do not appreciate the responsibility incurred by the doctor in granting a certificate, particularly in insurance and contract practice. It is beyond their comprehension that their doctor, for whose services they have contributed weekly payments, should hesitate to sign his name to any statement requested of them by employer, employment exchange, or school authority, etc. Certificates which were " ludicrous in the extreme " may have been issued as a means of avoiding prolonged argument during a busy surgery.

Under war conditions a number of new types of medical certificates are now demanded by Government Departments and local authorities. As a result of these certificates and coupons, a complex appears to have arisen which is rapidly leading to abuse. Some retailers of foodstuffs seek to solve the difficulty of distributing scarce commodities by requesting a medical certificate. In consequence of all this patients are tending to regard the surgery as an additional coupon office.

To end such abuses the medical certificate must be issued under stricter control. The patient must also be made to realize that all certificates cannot be demanded as a right. One way would be to charge a nominal fee in the form of a legal stamp, already customary with legal documents. A postage stamp could, for instance, be affixed to existing printed forms. Other certificates, including that of incapacity, could be supplied in printed book form with embossed Inland Revenue stamps, a practice already familiarly used. The annual yield to the Treasury from such a duty would be considerable, and the present time seems most appropriate for its introduction. As a result of the legalized formality of such an arrangement, the patient would tend to appreciate something of the nature of his request. The cost to be incurred would perhaps minimize unnecessary applications. A practitioner's refusal to accept payment for an unworthy application would be better understood than by a lengthy explanation. In some areas it is already the practice to charge a fee when issuing certificates, and it would be an advantage if a fixed charge could be agreed upon which would include the stamp duty.—I am, etc.,

May 20. R. H. GREIG.

SIR,—In the past few days I have signed certificates as follows: (1) for corsets; (2) to exempt fire watchers suffering from disease; (3) for extra milk; (4) to exempt from military service men passed as Grade I suffering from tuberculosis and Hodgkin's disease; (5) for one of two special types of gas-mask—only one of which is actually available. Surely it is time the B.M.A. took a hand in abolishing this certificate mania.

Apparently in the case of the extra milk the certificate must be signed every month; presumably to the official medical mind tuberculosis is a disease of a month's (or less) duration. Coupled with the recent warning of the G.M.C., and the fact that the nature of the person's illness has to be disclosed to clerks and dairymen, it is evident that the practitioner's word is not to be trusted, as he is warned by the judge—namely, the disciplinary body—and has to explain himself to the jury—the clerks and dairymen. I feel sure I am expressing the feelings of my colleagues, and hope you will publish this in your columns, which are our only mouthpiece.—I am, etc.,

Cottingham, E. Yorks, May 14. R. D. B. WRIGHT.

The Phoenix Number

SIR,—May I offer my congratulations on the production of last week's *British Medical Journal*, dated May 17, and its publication at the usual time? I wondered how you would do it, and I still do not know—it is a great effort.—I am, etc.,

W. K. FITCH,
Editor, the *Pharmaceutical Journal*.

London, W.C.1, May 22.

The Services

CASUALTIES IN THE MEDICAL SERVICES

ROYAL ARMY MEDICAL CORPS

Captain FRANK ROBERT OLIVER HAYWARD died suddenly at Guiting Grange on May 19. He received his medical education at Guy's Hospital and qualified M.R.C.S., L.R.C.P. in 1932. He had held the post of house-physician at St. Bartholomew's Hospital, Rochester, and before the war was in practice at Chelmsford, where he was honorary anaesthetist to the local hospital.

Prisoner of War

Major Alastair Gordon Donald Whyte, M.B.E.

DEATHS IN THE SERVICES

Major-General ALEXANDER ARTHUR SUTTON, C.B., D.S.O., late R.A.M.C., died at Tunbridge Wells on May 12, aged 79. He was born on November 30, 1861, took the L.R.C.P.Ed. and L.R.F.P.S.G. in 1884, an entered the Army as surgeon in 1885. He became colonel in 1915, major-general in 1917, and retired in 1920. He served in the campaign in Sierra Leone in 1898-9, when he was severely wounded (West African medal with clasp); in the South African War in 1899-1902, taking part in operations in the Orange Free State, including the actions of Paardeberg (wounded), Poplar Grove, Karnee Siding, Vet River, and Zand River; and in operations in the Transvaal, including actions at Pretoria, Johannesburg, and Diamond Hill, was mentioned in dispatches in 1901, and received the Queen's medal with four clasps, the King's medal with two clasps, and the D.S.O. He also served in the war of 1914-18, when he was twice mentioned in dispatches in 1916 and received the C.B. He also received the Serbian Order of St. Savi (Third Class) for services at Salonika in 1917.

Lieutenant-Colonel MICHAEL DAVID AHERN, O.B.E., R.A.M.C. (ret.), died in Dublin on May 10, aged 64. He was born on September 6, 1876, the elder son of the late Mr. T. Ahern, J.P., of Glanmire, County Cork, was educated at Queen's College, Cork, and at the Cecilia Street Hospital, Dublin, and took the Scottish triple qualification in 1902. Entering the R.A.M.C. as lieutenant in 1904, he became lieutenant-colonel in 1926, and retired in 1931. He served in the war of 1914-18 and received the O.B.E.

The Federal Department of Health in Mexico has been reorganized under the new administration with Dr. Victor Fernandez Manero chief of the Federal Department of Health, Dr. Mario Quinones Secretary-General, and Lou Babadilla in charge of the office.

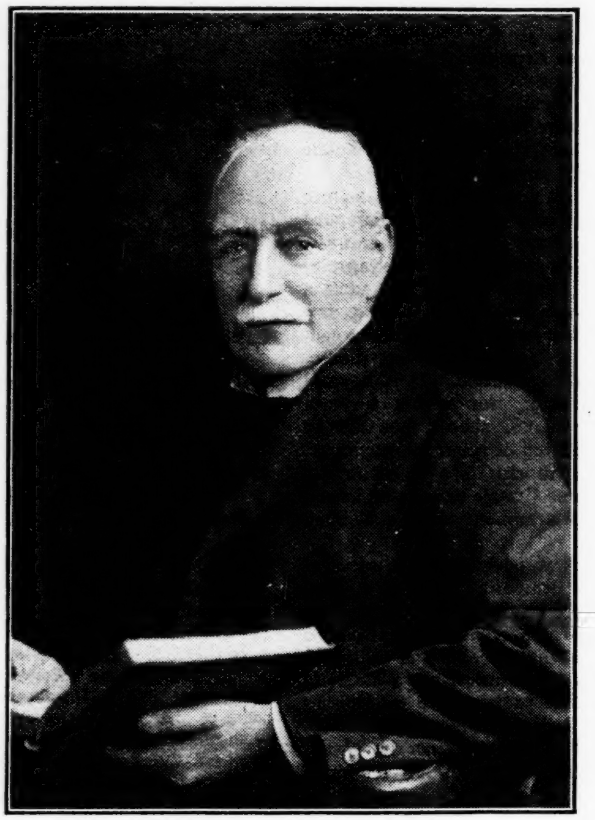
Obituary

SIR D'ARCY POWER K.B.E., F.R.C.S., F.S.A.

Surgeon and Medical Historian

As briefly announced in our last issue, Sir D'Arcy Power, surgeon, medical historian, biographer, and librarian, died on May 18 at his home at Northwood, Middlesex, to which he had lately moved after many years in Chandos Street, Cavendish Square. He was spared the news, made public a day or two after his death, of the damage caused by enemy action to the Royal College of Surgeons and its possessions which he had served so devotedly for over half a century. No English surgeon has ever been held in more affectionate regard in his own and other countries.

D'Arcy Power was born in London in 1855, the son of Henry Power, who died in 1911 at the age of 82, after serving St. Bartholomew's as ophthalmic surgeon for most of his working life. In a tribute to his father D'Arcy Power once wrote that his versatility, friendliness, and courtesy showed his Southern Irish ancestry, and his dogged perseverance was derived from a Dutch and a Quaker strain. Certainly the same qualities, however derived, were characteristic of the son. He was educated at St. Marylebone and All Souls' Grammar School and later at Merchant Taylors' in the City, where, at 17, he was awarded the prize as the boy best fitted for a merchant's office. This fate was averted, and he matriculated at Oxford, from New College, in 1874, and obtained an open exhibition at Exeter College in 1877. He then became demonstrator to the University, lecturer on physiology at Magdalen, gained a first-class in the honours school of natural science in 1878, and proceeded M.A. in 1881.



In 1878 he entered St. Bartholomew's, with which he was to identify himself as one of its most beloved and devoted sons. In a lecture given in later life, after recounting the jealousies and rivalries of the older Bart's, he described how when he came to the hospital as a young man of 23 he found himself among a "most intelligent body," who at once appointed him a teacher, invited him to their Christmas dinner, and told him they had given him the opportunity of winning his spurs should he be so inclined. The whole staff of the hospital, which then numbered twenty-eight, were his good friends. The teaching post to which he was assigned was that of assistant demonstrator of physiology. In 1882, the year of his qualification, he became house-surgeon to Sir William Savory. He once recalled that at the time he was assisting Savory in the theatre a single pair of forceps was alone provided to arrest bleeding even in so large an operation as amputation of the thigh.

His entrance into consulting practice may be said to have dated from 1885-6 when he was appointed surgeon to the Metropolitan Dispensary and assistant surgeon to the Victoria Hospital for Children. He retained the post of curator to the museum at St. Bartholomew's, and from 1889 to 1901 he was demonstrator of practical and of operative surgery at that hospital, and of surgical pathology from 1901 to 1904. Like John Hunter, he took an interest in comparative medicine, and from 1890 to 1903 he lectured on histology and physiology at the Royal Veterinary College. In 1898 he was elected assistant surgeon at St. Bartholomew's on the resignation of Sir Thomas Smith, and he became full surgeon in 1904 on the resignation of John Langton. This position he held until 1920, when he was made consulting surgeon. He had the reputation of being a good all-round surgeon who showed at his best in an emergency operation.

His election to the Fellowship of the Royal College of Surgeons had taken place in 1883, the year after he qualified. Six years later he had become an examiner in physiology for the Fellowship, a position he held for thirteen years. In 1896-7 he was Hunterian professor of surgery and pathology. He became a member of the College Council, at the same time as the late Lord Moynihan, in 1912, was re-elected in 1920, and made vice-president in 1921, and again in 1922. In 1919 he was Bradshaw Lecturer, in the following year Vicary Lecturer, and in 1925 Hunterian Orator. He represented the College on many important bodies—the Imperial Cancer Research Fund, the University of Bristol, and Queen Victoria's Jubilee Institute for Nurses among others—and he was the College delegate at the International Historical Congress in London in 1913, the centenary celebrations of the Académie de Médecine de Paris in 1920, and the opening of the Royal Australasian College of Surgeons at Melbourne in 1935. Of the many offices he held at the College, one, that of honorary librarian, was created for him. No one had greater knowledge of the treasures of the library or spent more time in its precincts. He was also at various times examiner for the Universities of Cambridge and Durham, Queen's University, Belfast, and the National University of Ireland.

But it is as a writer that Sir D'Arcy Power has the largest of his many claims to remembrance. His first published writing appeared in 1877. It was entitled "On the Albuminous Substances which occur in Urine in Albuminuria," and was written with Sir Lauder Brunton for St. Bartholomew's Hospital Reports. His first book, a manual for the physiological laboratory, written with Dr. Vincent Harris, was published within the next five years. His first clinical paper, notes on a case of congenital locomotor ataxia, from the wards of Dr. Samuel Gee, bears the date 1882. His first venture into the history of medicine was his admirable edition of South's "Memorials of the Craft of Surgery" (1886), prepared at the request of Sir James Paget, who wrote an introduction. This was followed by a long series of unsigned historical articles in the *British Medical Journal*. He "kept his head above water," to use his own phrase, by "devilling" for Ernest Hart, the then Editor, whom he described as a master in the art of extracting "copy" in the form of articles and abstracts at a moment's notice. Hart's encouragement and not less his criticism, which was sometimes caustic, served the literary apprentice in good stead. Since those early days we are glad to have published under "Nova et Vetera" or other title many an attractive and scholarly note from his pen, not to mention a large number of articles on clinical subjects and many reviews of books.

In 1931, on his seventy-fifth birthday, and on the initiative of the Osler Club, Sir D'Arcy was presented by subscribers with a volume of his "Selected Writings." To that volume is appended a short-title bibliography of his contributions to literature; it contains more than 600 entries. Many of these are short "lives" of medical and other worthies in the *Dictionary of National Biography*, to which his first contribution was made in 1893. In addition to biographies he wrote numerous articles on historical subjects connected with medicine, more especially the medicine of the sixteenth to the eighteenth century in England. In all this research and writing he was far from being the mere specialized antiquarian. He had a keen sense for the quaint and amusing, and a turn of his pen would give a bygone incident or practice its full human quality. The patience and skill which he displayed in illuminating the byways of medical history are illustrated in his presidential address to the Medical Society of London on "John Ward and his Diary." John Ward was a medically minded parson of Stratford-on-Avon in the seventeenth century, and the address was the outcome of four years' work, off and on, in transcribing sixteen small books of crabbed writing. In these out-of-the-way fields Sir D'Arcy Power was just as eager and inexhaustible as when he was on the more open ground of the work of Harvey and of Hunter, the history of hospitals, and the craft of surgery. One of his most valuable pieces of medical biography, carried out with the help of his colleagues, W. G. Spencer and G. E. Gask, was his revision of the biographical notices of the Fellows of the Royal College of Surgeons from 1843, when the diploma was first instituted. These had been drawn up with great patience by Victor Plarr, librarian of the College for many years, but never published in his lifetime. The work was brought up to date by D'Arcy Power and prepared for publication in 1930.

But it must not be supposed that he employed his writing only on historical subjects. He wrote extensively on cancer and on the surgery of the abdomen. Thus the bibliography above mentioned includes 77 articles on abdominal surgery, 39 on malignant diseases, 23 on orthopaedics, 12 on intussusception. Scarcely a number of the *British Journal of Surgery* appeared from 1913 onwards without some contribution from him. In 1895 he wrote his "Surgical Diseases of Children," and in 1915 an Oxford primer on "Wounds in War," and he was co-author of a "Handbook of Surgical Pathology" and a work on "Diseases of Joints."

No man was better known in the medical society life of London. He had been president of the Medical Society, the Harveian Society, and the Sections of History of Medicine and of Comparative Medicine of the Royal Society of Medicine; he was on the council of the Pathological Society and the British Orthopaedics Society. He had become a member of the British Medical Association in 1892, and was a sectional officer at various Annual Meetings and president of the Section of Surgery in 1926. He was corresponding member of several foreign societies, and one of the secretaries of the National Committee for the four International Congresses of Medicine which were held in various capitals between 1900 and 1909. He was vice-president of the London meeting of the International Society of the History of Medicine in 1921 and honorary president of the Geneva meeting in 1925. In 1938 he was honorary president of the International Society of Surgery. In 1924 he went to America, was for two months visiting surgeon-in-chief of the Peter Brigham Bent Hospital, Boston, and was made an honorary Fellow of the American Surgical Association at Baltimore, where he delivered an address on "How the Tradition of British Surgery came to America," with some information about the earliest English teachers to cross the Atlantic in the late eighteenth and early nineteenth centuries. In 1930 a small work of his, "Medicine in the British Isles," was published in New York.

Many societies outside medicine claimed his interest. He was the founder of the Samuel Pepys Club; he wrote a delightful medical history of Mr. and Mrs. Pepys, discovered who performed lithotomy on Samuel, and even prescribed glasses which would have enabled him to continue his diary. He was a prominent figure in the Society of Antiquaries and the Bibliographical Society, and was great among the Freemasons, founder of the Rahere Lodge at St. Bartholomew's. The building of the new Freemasons' Hospital at Hammersmith was a project near to his heart. The writer of this notice remembers being conducted round that building by Sir D'Arcy, who, in spite of his lameness and of entreaties not so to fatigue himself, insisted on accompanying his visitor to every floor and out on to the roof.

Many other activities in this full life can only be mentioned—his work for many years on behalf of the Royal Medical Benevolent Fund, as visitor for King Edward's Hospital Fund for London, as chairman of Pinewood Sanatorium, as member for eighteen years of the Faculty of Medicine of London University, as member of the Board of Management of the Metropolitan Convalescent Institution. Even eighty-five years seems too short to crowd in all this activity.

At the outbreak of the last war he became lieutenant-colonel R.A.M.C.(T.) and was officer in charge of the First London General Hospital (T.F.), and later on of its Surgical Division. He was also consulting surgeon to the military hospital at Bromley and surgeon to the Officers' Hospital at Fishmongers' Hall in the City. It was for this relatively brief service in military uniform, not for his lifetime in the library, that he received his knighthood in 1919.

In 1882 he married Eleanor, daughter of G. H. Fosbroke, M.R.C.S., of Yorkshire, who died in 1923. One of his sons was killed in the second battle of Ypres in 1915; the other, Group Captain D'Arcy Power, is in the R.A.F. Medical Service.

Long as is the catalogue of his achievements and distinctions and manifold as are his contributions to the lore of medicine, the outstanding thing which those who knew him will recall will be his unassuming friendliness, his cheery disposition, and his real beauty of character.

A note on some outstanding items in Sir D'Arcy Power's personal library, which he had instructed Messrs. Sotheby to sell next month, will be found at page 830 of this issue of the *Journal*.

[The portrait reproduced is by Lafayette.]

W. H. GIBSON, M.B., AND L. F. SKINNIDER, M.B.

We regret to announce the deaths, through enemy action, of two Paisley practitioners, Dr. William Hamilton Gibson and Dr. Leo Francis Skinnider.

Dr. Gibson graduated in medicine at Glasgow University early in the last war and served with the R.A.M.C. at home and abroad. On demobilization he took over the old-established practice of Dr. William Russell of Paisley. He soon began to take an interest in public affairs, and for some years served on the town council, resigning in 1930, under the conditions of the new Local Government Act, on his appointment as visiting physician to two hospitals of the local authority—Craw Road and Auchentalie. He was elected to the magistracy in 1928. He was examiner to the St. Andrew's Association, lecturer to the Provident Co-operative Ambulance Corps, honorary surgeon to the Boy Scout movement, and the leading figure in the local branch of the British Legion in its work in helping men who had served in the last war. He had been chairman of the Panel Committee and he was a member of the British Medical Association, having been elected in 1921. Another of his activities was his directorship of the Royal Victoria Eye Infirmary, the chairman of which, at a meeting of the directors following his death, spoke of the great indebtedness of that institution to Dr. Gibson for his thirteen years' service.

Dr. L. F. Skinnider was a rather younger man. He graduated at Glasgow in 1924 and had been for fifteen years in practice in Paisley, where his father, the late Mr. A. S. Skinnider, was for a great many years a well-known journalist. He also was a member of the Paisley Panel Committee and, since the time of his qualification, of the British Medical Association. Both men were highly respected in the local community, especially by their medical colleagues, and their tragic death is keenly felt. Dr. Gibson is survived by his wife and three children; Dr. Skinnider, who was a widower, by two small sons.

The sudden and tragic death of WILLIAM GRAY, caused by enemy action in Liverpool while carrying out his duties, was a great shock to his many friends in Edinburgh. He came from Canada in 1927 and graduated in Edinburgh in 1932. As a student (writes G. L. C.) he acted as one of the unqualified assistants in my surgical clinic in 1930. After graduating, the managers of the Edinburgh Royal Infirmary appointed him, at my request, resident house-surgeon to the wards under my charge. On the termination of this appointment, Mr. Pirie Watson, who, as assistant surgeon, had seen his good work, appointed him resident surgeon at Leith Hospital. Not content with a year of hospital work after graduation, Gray then went to Liverpool and specialized in orthopaedic surgery, obtaining the M.Ch.(Orth.) degree in Liverpool in 1937. Two years later he obtained the Fellowship of the Royal College of Surgeons, Edinburgh. At the time of his death he was deputy medical superintendent, Mill Road Infirmary, Liverpool. William Gray's record since graduation, so far as work is concerned, speaks for itself, but he had something more than ability—a charm, difficult to define, due to a bright personality, a lovable disposition, and a quiet musical voice, all of which endeared him to those who knew him. A promising career has been ruthlessly cut short. The deepest sympathy of all his friends is extended to his widow and his parents in Canada.

Dr. JOHN SLIGHT GRAY has been reported killed by enemy action in April, 1941, aged 28. He was the younger son of Mr. and Mrs. George Gray, of Riselaw Crescent, Edinburgh, and took the M.B. and Ch.B. at Edinburgh in 1939.

Universities and Colleges

UNIVERSITY OF LONDON

LONDON HOSPITAL MEDICAL COLLEGE

The College Board have made the following awards for 1941-2: Price Scholarship in Science (value £100).—A. J. Dinn. Open University Scholarships (a) (£100).—A. Comfort, Trinity College, Cambridge; (b) (£100).—K. A. A. Wray, King's College, Cambridge, and P. F. Haggart, Downing College, Cambridge (Scholarship divided).

UNIVERSITY OF OXFORD

Diploma in Ophthalmology, 1941

The Board of the Faculty of Medicine gives notice that the two-months course of instruction at the Oxford Eye Hospital will begin on Monday, October 13. The examination will be held beginning on Monday, December 8; names must be received at the University Registry not later than 3 p.m. on Wednesday, November 19.

Medical Notes in Parliament

Duty on Patent Medicines

On May 20, Mr. KEELING asked the Chancellor of the Exchequer whether he was aware that his predecessor, when withdrawing, in response to the views of the House, his proposal to discontinue the taxation of patent medicines, promised to re-examine the question of continuing to tax them, and repeated this promise to a deputation of members, whether the re-examination took place, and with what result. Sir KINGSLEY WOOD replied that on the outbreak of war, in view of the pressure on the time of all concerned, the procedure contemplated by his predecessor was abandoned. Subsequently, however, on August 13 last he gave an undertaking to see, before the next Finance Bill, whether he could not get the parties together and try to get some reasonable solution of the matter. Mr. Keeling was aware of the recent developments in this connexion.

MR. KEELING asked if Sir Kingsley Wood was aware that the only parties consulted were the vendors. Did the Minister think it right that the Government should have violated their express promise without any word of explanation. Sir KINGSLEY WOOD said he thought that the procedure now in operation was the best one possible. They could not have a long inquiry, but the Minister of Health was in touch with all parties interested in the matter. Viscountess ASTOR asked if the advertisement of patent medicines was not one of the scandals which was dealt with in the last war. No one knew why the Government had given in on this.

Liquid Fire Extinguishers

Many chemical liquids, for which the claim is made that they extinguish incendiary bombs, have been tested by the Research and Experiments Department of the Ministry of Home Security. None has been found which can be recommended in preference to water. Mr. MABANE in stating this on May 21 added that some of the liquids being sold are corrosive; some contain caustic substances dangerous to the eyes; others produce fumes and smoke which may be harmful and make fire-fighting difficult.

N.H.I.: Income Limit to be Raised

Mr. ERNEST BROWN announced on May 22 that the Government intended to introduce very shortly legislation to increase the benefits payable under National Health Insurance, in particular, sickness, maternity, and disablement benefits. This legislation could not, in present circumstances, be more than an interim measure designed to give effect to changes in the health insurance scheme necessary to meet wartime conditions. The Government hoped it would be possible to carry through in due course a thorough overhaul of the existing schemes of social insurance, particularly health and pensions insurance and workmen's compensation. It held that the comprehensive survey of the existing schemes which must be an essential preliminary to such legislation should be set on foot at once as part of post-war planning. The survey was to be undertaken forthwith by Mr. Greenwood in association with other Ministers concerned.

The Bill which the Government intended to introduce shortly would, as from the beginning of the next benefit year in January next, increase by 3s. the statutory rates of sickness and disablement benefits payable under the Health Insurance Acts. The sickness benefit for a man would be raised from 15s. to 18s., and his disablement benefit from 7s. 6d. to 10s. 6d. For single women and widows the new rates would be 15s. and 9s. respectively, and for married women 13s. and 8s. Any cash additional benefits would continue to be payable over and above these minimum rates. These changes would be made possible by the payment of State grant on the usual basis and by increasing by 2d. the weekly contributions payable in respect of men and women alike—1d. of this increase to be borne by the employer and 1d. by the insured person. The Bill would also raise to £420, as from January next, the remuneration limit for the compulsory health and pensions insurance of non-manual workers. In addition to other health and pensions rights, this would give to rather fewer than 500,000 fresh persons a title to free medical treatment and attendance. The position thus created was being discussed with the medical profession. Power would also be sought in the Bill to deal with the position in insurance of civilian prisoners of war and other similar war problems.

Ministry of Health Report.—Mr. ERNEST BROWN announced on May 8 that he proposed to issue from the Ministry of Health a summarized report covering the two years ended March 31, 1941, when this material had been collated. Sir FRANCIS FREMANTLE asked whether this reply referred to the Annual Report of the Chief Medical Officer of the Ministry or to the Report of the Department. Mr. BROWN: I shall do my best to have at least a summary published.

Combatant German Medical Personnel.—On May 20, Mr. SORENSEN asked the Secretary of State for War whether he had evidence to show that members of the German Army Medical Corps either were trained in the use of arms or employed them during action against our own or Allied troops. Captain MARGESSON said that no instances had been brought to his notice of the use of arms by German Army medical personnel in action against British or Allied troops, but he was making further inquiries. International law permitted the training of medical personnel in the use of arms in their own defence.

Notes in Brief

The number of death certificates received during the year 1939 in which vaccinia or vaccination was mentioned or the death was attributed to vaccinia or vaccination, and the ages in each case, were as follows: *Non-civilians:* 1 at 20 years. *Civilians:* 1 at 4 months and 1 at 31 years.

EPIDEMIOLOGICAL NOTES

Infectious Diseases for the Week

A small increase, 38, in the number of cases of scarlet fever was reported in England and Wales, but only in four counties did the total differ appreciably from that of the preceding week—namely, London, Essex, and Yorkshire (West Riding), with increases of 10, 19, and 13 respectively, and Somerset, where the notifications decreased by 18. The returns for Scotland showed an increase of 28 cases.

The counties of England and Wales showed only slight variation in the number of notifications of diphtheria compared with the previous week. An increase of 19 was recorded for England and Wales and 7 for Scotland.

The notifications for dysentery, 103, were 3 less than in the preceding week. Local outbreaks were reported from two London boroughs: 15 cases in Islington (in an institution) and 10 in Wandsworth. In Scotland 40 fresh cases were reported during the week, compared with 63 for the previous week.

The incidence of enteric fever has been almost doubled in England and Wales, and halved in Scotland. In the former country a quarter of the total was recorded in Middlesex—13 cases. Multiple cases were reported from London 6, Warwickshire 5, Chester 4, and Northumberland 5.

Measles

The trend of the incidence of measles in Scotland is in striking contrast to that of England and Wales. The notifications in the latter country numbered 11,004, a reduction of 2,879 compared with the total of the preceding week. The only counties from which increases were reported were Cornwall, Nottinghamshire, and Sussex, where the notifications were 51, 65, and 44 respectively in excess of those recorded last week. In Scotland 242 cases of measles were notified, an increase of 116. Two-thirds of the total were recorded in Lanarkshire, and 115 of these were in Glasgow.

Whooping-cough

The returns for whooping-cough showed the same contrasting trend between England and Wales and Scotland. In Scotland the notifications numbered 833, an increase of 284 on the last week and 614 above the previous fortnight. The returns are dominated by those of Glasgow, where 714 cases were reported during the week under review. Although the notifications of whooping-cough in England and Wales were 99 less than in the previous week, the returns for several counties showed increases. The four fairly large increases reported were confined to small areas within the county. They were Middlesex, Finchley M.B.; Warwickshire, Birmingham C.B.; Yorkshire North Riding, Middlesbrough C.B.; and Yorkshire West Riding, Aldwick-le-Street U.D.

Cerebrospinal Fever

The incidence of cerebrospinal fever showed a slight increase in England and Wales: 17 more cases were reported than in the previous week. The only variation of any size that occurred between the notifications of the past two weeks was in London, where the cases rose from 22 to 37, dispersed throughout the metropolis. Twenty-one out of the twenty-eight metropolitan boroughs had at least one case during the week. The largest number of notifications in any borough was 4, and the boroughs with this number were Bethnal Green, Stepney, and Woolwich. In Scotland, where the incidence of cerebrospinal fever had been mounting during the previous three weeks, a large decline was recorded. The notifications for the past four weeks were 54, 77, 97, and 37.

G. R. Bakus and E. P. Griffin, jun. (*Amer. J. clin. Path.*, 1941, **11**, 252) report a case of teratomatous chorion epithelioma of the ovary in a virgin aged 13, who was operated on for appendicitis and on whom oöphorectomy was performed. Death due to metastases in the kidneys and lungs took place six months after the operation. The case is remarkable in that the majority of cases of chorion epithelioma are associated with pregnancy.

No. 18

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended May 3.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1941					1940 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	326	37	37	6	13	377	29	83	2	10
Deaths		4	5				5	8		
Diphtheria	931	41	220	32	34	701	31	257	42	40
Deaths	25	3	7	2	—	15	1	11	3	1
Dysentery	103	30	40	—	—	80	5	31	—	—
Deaths			—	—	—			—	—	—
Encephalitis lethargica, acute	4	—	1	—	—	4	1	—	1	—
Deaths		—					1	1		
Enteric (typhoid and paratyphoid) fever	50	4	49	7	1	33	3	10	4	1
Deaths	—	—	—	—	—	—	—	—	—	—
Erysipelas			50	5	2			49	12	5
Deaths		—		—			—	2		
Infective enteritis or diarrhoea under 2 years										
Deaths	36	5	7	7	1	26	5	8	3	2
Measles	11,004	363	242		11	5,286	48	426		161
Deaths	10	3	—	—	—	7	—	2	—	2
Ophthalmia neonatorum	89	3	16		—	109	13	27		—
Deaths										
Pneumonia, influenzal*	908	45	9	12	9	883	45	9	7	11
Deaths (from influenza)	34	3	3	3	—	35	4	1	—	2
Pneumonia, primary			192	13				269	13	
Deaths		—		11	12		59		10	26
Polio-encephalitis, acute	1	—				2	1			
Deaths		—					—			
Poliomyelitis, acute	8	—	2	1	—	2	—	2	1	—
Deaths		—					—	—		
Puerperal fever	—	—	7	2	1	3	3	14	1	—
Deaths		—					1			
Puerperal pyrexia	128	6	8		3	153	17	29		4
Deaths										
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,059	57	145	55	31	946	27	122	41	62
Deaths	1	—	—	—	—	1	—	—	—	—
Small-pox	—	—	—	—	—	—	—	—	—	—
Deaths	—	—	—	—	—	—	—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough	4,088	121	833		4	630	8	36		8
Deaths	22	2	12	2	—	1	—	—	1	1
Deaths (0-1 year)	371	35	89	36	22	344	47	72	27	35
Infant mortality rate (per 1,000 live births)										
Deaths (excluding still-births)	5,620	828	692	211	199	4,857	796	720	206	179
Annual death rate (per 1,000 persons living)			15.1	14.0	17.4			13.4	13.8	15.7
Live births	5,160	430	936	387	211	6,572	1,052	960	399	262
Annual rate per 1,000 persons living			19.0	25.7	18.5			19.4	26.6	23.0
Stillbirths	226	19	47			253	30	34		
Rate per 1,000 total births (including stillborn)			48					34		

* Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.

Medical News

The B.B.C. announces that a broadcast on the work of the Edinburgh Medical Missionary Society will be given in the Home Service on June 1 by Mr. W. J. Stuart.

The twenty-first annual meeting of the British Association of Dermatology and Syphilology will be held at Glasgow on July 11 and 12, under the presidency of Dr. W. H. Brown. The subject for discussion will be "Avitaminosis in relation to Skin Disease," which will be opened by Prof. J. W. McNee and Dr. G. W. Bamber. Further information can be obtained from the secretary, Dr. Henry MacCormac, 23, Wimpole Street, W.1.

The Quarterly Board of Westminster Hospital received on May 22 news concerning a new branch to be opened for in-patients in one of the Home Counties. The Board having previously agreed that a building should be obtained in which ward work could be carried on out of London, the Secretary reported that a very large property, in quiet surroundings, well equipped for adaptation as a hospital for 100 to 150 patients, had been found at a moderate yearly rental. Twenty beds in this building will be reserved for treatment of in-patients with radium.

The Hanbury Medal "for high excellence in the prosecution of original research in the natural history and chemistry of drugs" has been awarded to Harold King, D.Sc., F.R.S., of the National Institute for Medical Research, who has done important work on synthetic arsenical preparations and on the chemistry of alkaloids and sterols; also on hormones and the cardiac glucosides. The adjudicators of the medal are the Presidents of the Chemical, Linnean, and Pharmaceutical Societies, and the Chairman of the British Pharmaceutical Conference.

Agreement has been reached between the Ministry of Health and the British Hospitals Association on the financial adjustment to be made when, owing to enemy action, hospitals in vulnerable areas have to reduce their complement of beds and transfer civilian sick to institutions coming within the Emergency Hospitals Scheme. The expenditure of the hospital is to be apportioned according to the beds actually kept in commission for civilian sick and for casualties, and the hospital is to credit the Ministry with the number of "lost" civilian beds. This agreement is the subject of Circular 2308 sent by the Ministry to all voluntary hospitals in the scheme, and an accompanying document (War 184) gives details, including method of assessing bed complement in certain instances and the amount of the credit, and also the allowance to be made to hospitals for loss of patients' contributions.

The Ministry of Health is arranging for children in attendance at clinics to have black-currant syrup made from a formula drawn up by the Bristol University Agricultural Station. Black currants are well known to be very rich in ascorbic acid, and this syrup is stated to contain five times the vitamin C content of orange juice.

Prof. A. V. Hill, Sc.D., M.P., one of the secretaries of the Royal Society, has been elected a foreign associate of the United States National Academy of Sciences.

The Minister of Health has approved the appointment of Dr. N. M. Goodman and Dr. V. D. Allison as deputy senior medical officers of the Ministry.

Dr. Harold George Broadbridge has been appointed Coroner for West Middlesex in succession to Mr. R. Kemp, who retired recently.

Dr. Carl Neuberg, a German biochemist, has become professor of biochemistry at the New York University College of Arts and Science. He was formerly professor in that subject in Berlin, Amsterdam, and Jerusalem.

Following the increase in marriages there has been a big rise in the Australian birth rate. Births for the three months ending September 30, 1940, totalled 32,637, more by 1,353 than in the same period in 1939. There were 14,026 marriages in the last quarter of 1939—800 more than in the last quarter of 1938. New Zealand also reports an increased birth rate. The 1940 rate is the highest recorded since 1925, and the number of births registered exceeded the previous record total of 29,291 by nearly 3,000.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.
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LETTERS, NOTES, ETC.

"Whither Welfare?"

DR. G. ARBOUR STEPHENS (Swansea) writes: May I congratulate you highly on the splendid appearance of the *B.M.J.* of May 17, produced under conditions calculated to depress the most optimistic To everyone who has helped in so good a work be praise! I am very glad that during the stress you were able to place Sir Leonard Hill's letter (May 17, p. 764), even though it has a most peculiar tail. He calls attention to a most important article by Dr. Cicely Williams (May 10, p. 719). As one who started the first "mothercraft classes" for schoolgirls, and also the first mothers and babies welfare centre in Wales, I am in a position to appreciate much of what appears in that article. The great mistake is to assume that medical science and the medical profession are synonymous. The ability of the average man in any walk of life is a low one. The average teacher, preacher, plumber, or "doctor" is very badly informed. Dr. Williams points out that great discoveries in medical science are not implemented (except by the wholesale drug houses) by the medical profession, but what does the average medical man know or care about "science"? The preliminary science examination is no test of scientific knowledge, and the assumption of infallibility by one who has just scraped through a qualifying examination precludes all possibility of preventing disease by such a person. Fifty per cent. of our hospitals would be superfluous were we to feed ourselves properly.

"Bureaucratic Surgery"

DR. ROWLAND COCKSHUT (Hendon) writes: The ingenuity of the human mind is infinite. One would not have thought it possible to contest Mr. Lake's conclusions, but Prof. Jefferson, defending the proposal to establish centres for the treatment of head injuries, including scalp wounds, says, "Once it had been decided to open these centres, the next question was, What types of injury were to go into them?" And Dr. F. M. R. Walshe says, "We have all been very ignorant of the incidence, range, and character of the abnormal neurological signs that may accompany apparently trivial scalp wounds." I submit that there is a lack of information of the incidence, range, and character of the results which may flow from sitting on a pin. They vary from acute septicaemia to the later appearance of the pin sticking out of the great toe. And the ultimate results, especially from the point of view of psychologists, of a good crack on the funny-bone in early youth are almost completely uninvestigated. I have been struck lately by the case of a man whose libido was released and whose Oedipus complex went into a fugue by a sound smack on the funny-bone. Now that the new centres are ready, what shall we put in them?—indubitably the traumatic pin-pricks and the traumatic funny-bones. My own two children had seven very traumatic cranial wounds at odd times which I stitched in the bath-room. *Fortunati ambo!* The children of the 1960 doctor will perhaps live in an age when there will be centres for head wounds, and, what is more, some sanitary inspector will force them to go there. I dedicate this letter to the untold millions of broken heads, stitched by ignorant practitioners who never knew that "abnormal neurological signs are to be found in a considerable portion of such cases by those who, trained to elicit them, make a systematic search for them." "Out of sight," sez you, "Out of mind," sez I.

New Dried Milk for Infants

The Ministry of Food will shortly supply under the National Milk Scheme a new dried milk with a modified cream content of 16½% instead of the usual 27%. It is intended for babies under 12 months old who are likely to suffer from digestive troubles if fed on full-cream dried milk. As it may not be suitable for all infants, mothers applying for it should first obtain the advice of a doctor or a welfare centre. The new product will be known as "Half-cream National Dried Milk." The full-cream powder, however, will still be available.